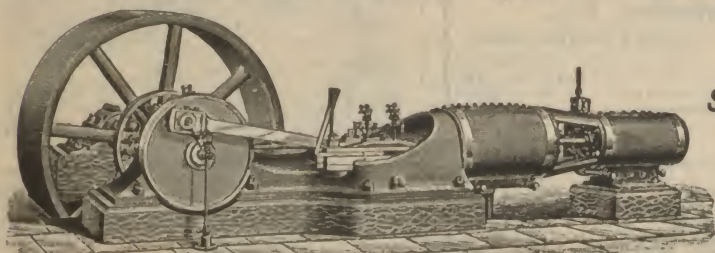


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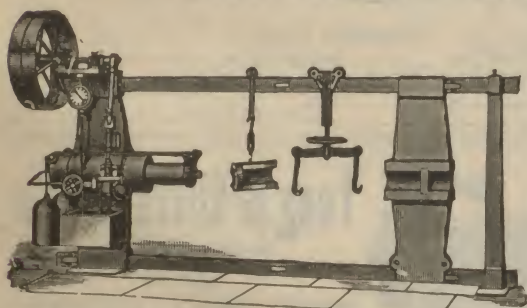


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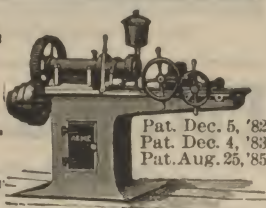


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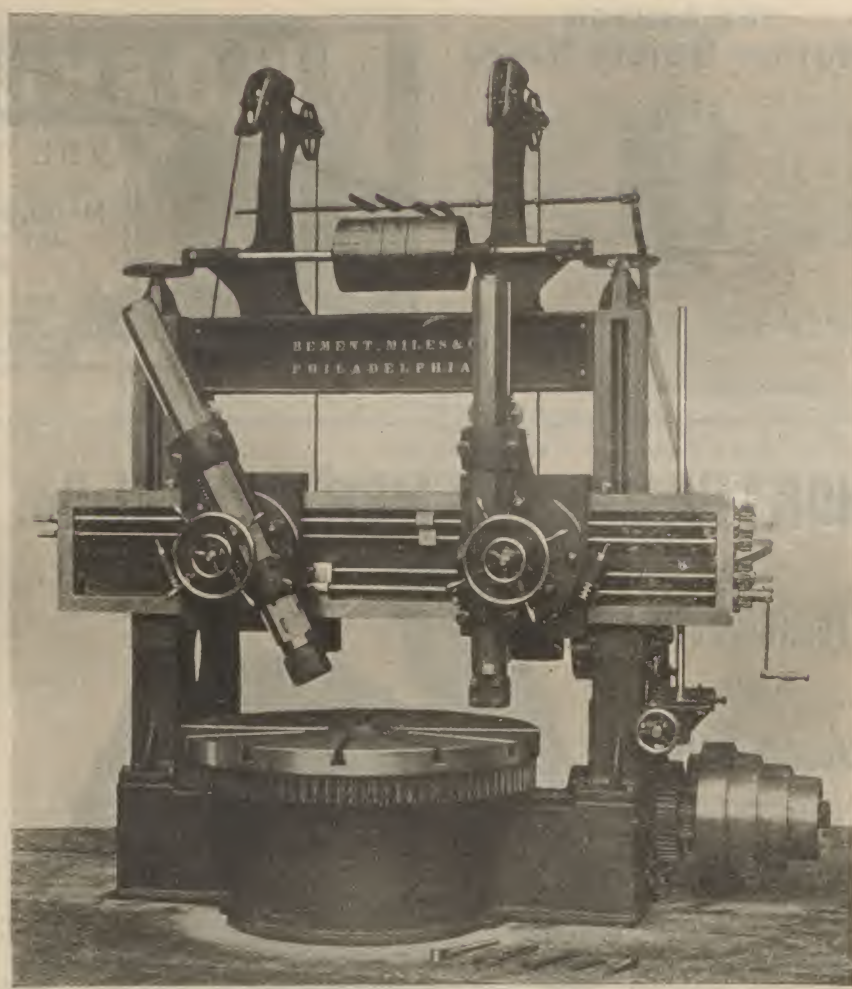
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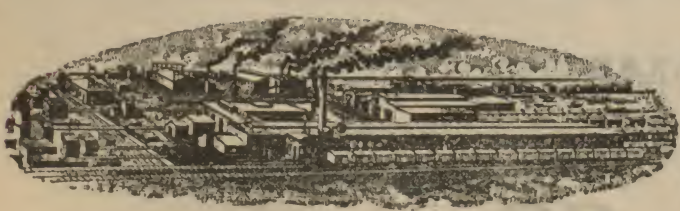
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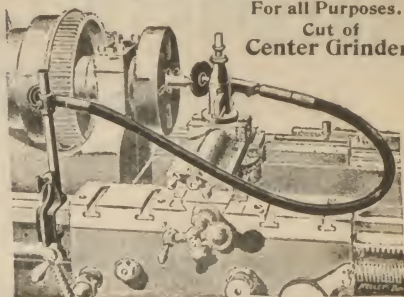
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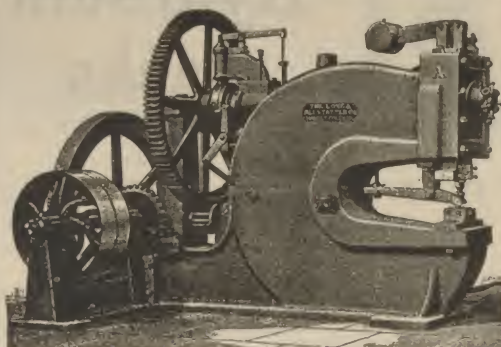
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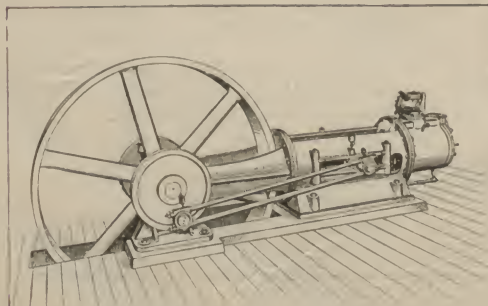
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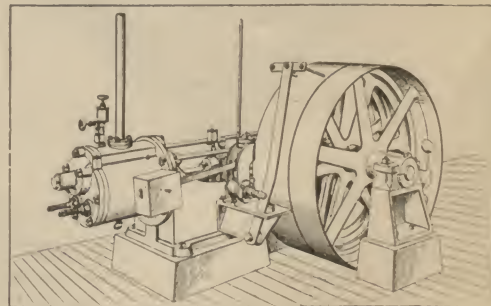


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THE RAILWAY REVIEW

XXXVI.

MARCH 14, 1896.

No. II.

INVENTION OF THE LOCOMOTIVE WHISTLE.—The "cock and bull" story in "Cassell's Magazine" about how the locomotive whistle came to be invented is knocked out in one round by Locomotive Engineering. The story goes on to say that in 1833 a farmer with a load of eggs having been struck at a crossing, the expense to the railroad company was so great that one of the directors went to George Stephenson and got him to invent the locomotive whistle. Stories of this kind merely excite the ridicule of people fairly well informed about the history of inventions. According to the journal above referred to a steam whistle, something in the form of a letter carrier's whistle, was in use about the beginning of this century; but the cup whistle was not invented till about 1830. It was first used at the Dowlais Iron Works, in Wales, and is supposed to have been the invention of a workman named William Stephens. It was first applied to a locomotive in 1835 by Bury, a well-known locomotive builder in England.

UTILIZATION OF WATER POWERS.—A Reuter dispatch from Christiania, states that the estate of Hafslund, near the great waterfall known as the Sarpsfos, between Christiania and Goteborg, has been acquired by a syndicate, chiefly consisting of German and American capitalists, for the sum of 800,000 kroner (a krone is 27 cents.) The purchasers intended to form a new company, with capital of 3,000,000 to 5,000,000 kroner, in order to utilize the water power of the falls for electrical force, and establishing aluminum works on the same principle as those now being constructed at the falls of Foyers, in Scotland. The Sarpsfos is one of the finest falls in Southeastern Norway, being 74 ft. in height and 116 ft. in width. The water power is already utilized, however, by numerous saw mills and cellulose factories, and the railway crosses the fall, so that the proposed new works will probably not interfere to any great extent with the artistic aspect of the place.

REINFORCING HEADBLOCKS.—During the spring, when the ground is softened by rains, foremen frequently find a headblock of a stub switch that gives them great annoyance by continually going down. This is generally the case when the switch is located over a strata of clay. The rain percolates through the ballast and is held by the clay, which is almost impervious to water. After a time, when the two are well mixed, they form a foundation having about the same resistance per square foot as soft soap. In such cases the headblock should be reinforced some way. A good plan is to remove one tie each side of the headblock, dig a trench 18 in. wide, 8 in. below bottom of headblock and 8 ft. long on each side of it. Then after cutting four good wide-faced ties in two, pick the dirt out from under the end of headblock, opposite switch stand, and put one of the half ties under it. Raise the headblock until it is a shade high and then tamp the cross tie; knock out some more dirt and put in another half tie and continue until all are in. This will give the headblock a solid foundation, 4 ft. wide and 8 ft. long, which will last for years. Care should be taken not to get it too high, as it will not go down until the headblock or ties rot out. —[Jerry Sullivan, in Roadmaster and Foreman.]

COST OF THE KEIL CANAL.—It is definitely stated that the cost of the Keil canal has reached the sum of \$39,000,000. It is about 61 miles long, 20 ft. deep at dead low water, and 229 ft. wide, in numerous places the width increasing to some 428 ft., to allow the largest vessels to pass each other, and work will be continued until vessels of any depth can pass at low water. The embankment is stone lined to a depth of six feet below the water, and the locks at the North Sea end of the canal are said to be the largest in the world, with the exception of that at Bremerhaven. Two bridges span it at a height of 137 ft. above the water, and there are also 6 opening bridges and 16 ferries.

IRON AND THE ACTION OF STEAM ON LUBRICANTS.—Dr. Holde is engaged in an investigation upon the action of super-heated steam on lubricants and the corrosion of iron by these oils. The supplement to the communications from the Technical Testing Station at Berlin, publishes the research, an abstract of which is to be found in Stahl und Eisen of Jan. 1. The work is not yet complete, but so much is clear, that the lubricants are decomposed by steam at higher pressure, and that the decomposed oils may seriously corrode the iron. The continued exposure to steam transforms the oils into fatty acids, which attack the iron, yielding the greenish or brownish greasy pastes which everybody knows. The observation that refined rape oils proved much more deleterious than common rape oil is peculiar, and needs further elucidation. During the refinement, acids are introduced, of course, but they are not supposed to remain in the oil. The addition of mineral oils to vegetable oils seems to have a more beneficial influence than one should expect. Although mineral oils come out far better than tallow and vegetable oils.

BURNING POWDERED COAL.—A process which has lately been brought out by Carl Wegener for utilizing powdered coal, is described in Engineering (London). The coal, which has been ground to pass through a 60 mesh screen, is fed into a hopper which is located in front of the furnace. At the bottom of the hopper is a grating, which can be agitated from 150 to 250 times to the minute, according to the rapidity of feed desired. The coal dust falls through the grate into the bend of an air supply pipe, which enters the furnace at the top of the furnace door. As it falls into this pipe it is met by the induced draught and carried into the furnace. The interior of the furnace is lined with fire-brick for a length of 10 or 12 ft., and has in addition two fire-brick bridges. There is no grate and there are no

fire-doors, so called, the combustion being watched through peep holes. A test was recently made in Berlin of a Cornish boiler, fired first by hand and again by the same coal in a powdered condition. The results show that the dry powdered coal evaporated from and at 212 deg. 9.12 lbs. of water per pound of dry coal, as against 6.48 lbs. for solid coal, fed by hand stoking. It is claimed that the poor condition of the grate is responsible for the very low results in the latter case. The trial, however, shows good economy for the Wegener system. The grinding costs about 10 per cent of the value of the coal.

STEEL PIPES PREFERRED TO COPPER FOR OCEAN VESSELS.—In a recent discussion before the British Institution of Naval Architects on steam pipes for ocean vessels, the preponderance of opinion is stated to have been in favor of steel, a somewhat notable conclusion in view of the fact of copper being the material usually employed for making the big pipes which conduct steam from boiler to engine on steamships—by reason of its ductility that metal being admirably adapted to the necessary though slight changes in shape resulting from heating and vibration. It is argued, however, that with the higher pressures now carried greater thickness is required, hence a copper steam pipe must lose the advantage of bending readily and its strength becomes more uncertain; the customary method of manufacture is to cut up sheets into strips and braze or solder the edges, but as the difficulties of making a tight joint increase with the thickness of the material, there is now said to be a tendency among marine engineers toward the substitution of iron or steel for copper in this part of a vessel's fittings.

OILING LONG DRILLS.—Sometimes it is necessary to make a very long drill hole of comparatively small diameter; and in doing this the work goes bravely on for the first few feet, but after that there is not only the trouble of backing out to get rid of the chips, but the nuisance of having to oil the cutting portion. In the Pratt & Whitney shops the latter trouble is done away with by forming along the drill a flute or channel, straight or spiral, according as the drill is or is not of the twist type; and then by brazing in a strip of brass, closing up this channel externally so that it acts as a duct for the oil, while at the same time not catching any chips. Externally it is turned off true with the outside surface of the drill itself, so that it offers no obstruction in working. Oil is forced in, and comes out with the chips. This is not a cheap tool to make, but it is much cheaper to use it than to have the tool break in the hole. Apropos of long drilling, the Bement & Miles Company, in making a small 35 ft. long hole, $\frac{3}{4}$ in. in diameter through a cutter bar for "Uncle Sam," ran in $17\frac{1}{2}$ ft. from each end, the two bores meeting in the middle, and being only one thirty-second of an inch out of axial exactness. The object in this case was merely to lighten the bar.—[Engineering Mechanics.]

RESPONSIBILITY FOR "SPREADING RAILS."—Mr. Paul Reinhard touches a very tender spot when he affirms his belief that accidents caused by rails spreading are the result of negligence on the part of trackmen says Jerry Sullivan in Roadmaster and Foreman. The press of this country in reporting such cases generally class the cause as "unavoidable," and if the editor has an annual pass he is liable to go farther and say it was an "act of Providence." Even railroad officials, when investigating the cause of accidents, stop suddenly when they run up against the words "rails spread." That settles it, and no further inquiry is made. These good people cannot be expected to know that the track is put in proper line at first and when it begins getting rough the rail spreads only by almost imperceptible degrees, and that in order to allow the wheels to drop between the rails would have to move about four inches, and this would require from one to two weeks at least. Nor do they know that the ties are put in new, and if an accident was caused by their being rotten that this process has been going on for from four to ten years. In either instance they do not think of blaming the trackman for not seeing these things as he daily inspects his section. If they did the foreman might have to answer for his negligence before a criminal court.

SOLIDIFIED PETROLEUM.—The new process for solidifying petroleum invented by Paul d'Humy, a French naval officer, has already been referred to, but further details are given by a writer who saw numerous experiments made with the new fuel. It is stated that heavy common oil has been converted by the inventor into a solid block, as hard as the hardest coal; it will burn slowly, give off intense heat, and it shows not the slightest sign of melting. A ton of this fuel represents, M. d'Humy said, 30 tons of coal; and the space occupied by one ton of it is about 3 cu. ft., as against the large space filled with the coal. Having explained the uses to which his new fuel might be put, and some of the advantages it offers, M. d'Humy proceeded to show some samples of it, and to make experiments with them. On the table were a number of cakes of solidified petroleum and low grade oils, of various sizes and shapes, and looking not altogether unlike lumps of ginger bread or tharve cake. In addition to the cakes there were samples of the same fuel in dry powder and paste. The petroleum powder and paste mixed together and pressed, form a homogeneous mass, with a great specific gravity, hard almost as stone, and when burning will give off a flame of 300 times its own volume, and a heat well nigh as great as oxygen. M. d'Humy placed in the grate in his room a piece of solidified petroleum about 10 oz. in weight, and on its being fired with a match it gave off a powerful steady flame. A little later he put a small quantity of the powdered petroleum in the grate on the top of cinders, and when fired the flame filled the grate. He put a shovel of ashes on the top and the flame came through them, and all appeared to be in a blaze. Tests were applied to discover if there was either smoke or smell, and neither could be detected. There was also on view a black cake made from heavy bituminous oil, very dense and very heavy, and the flame from that burning under a boiler would, he said, cover all the space. He also showed a sample of disintegrated wood, which when mixed with solid petroleum, made a very heavy hard bulk, forming a splendid fire for use on board ship or under an

ordinary boiler. The fuel can be pressed to any shape and used for a variety of purposes.

TIMBER TESTS BY THE U. S. DEPARTMENT OF AGRICULTURE.

In answer to a communication from Mr. Walter G. Berg, principal assistant engineer of the Lehigh Valley Railroad, asking for a statement of the status of the timber test work which has been carried out by the department of agriculture. Mr. B. E. Fernow, chief of the division of forestry wrote the following letter under date of March 2, 1896. Permission has been given for the publication of this letter through the courtesy of Mr. Berg, and the secretary of the American Society of Civil Engineers.

Replying to your request for information regarding the status of the timber test work, especially as regards the kinds tested, number of tests and the data worked up, which I understand you desire in order to keep the American Society of Civil Engineers informed as to the progress of this work most interesting to them, I may make the following brief statement:

The total number of tests made at the mechanical laboratory to January 31, was 39,437, which during February will be brought up to about 41,500, when all the material collected will be tested and the work for the present abandoned under the orders of the Secretary of Agriculture.

In the above-number the moisture determinations which accompany the tests are included reducing the actual number of mechanical tests to probably 35,000.

The material for these tests was specially collected in the woods, comprising 356 trees representing 32 species mainly of southern growth. The distribution of tests by species stands as follows:

Southern pines (5 species) - - -	20,341
Northern pines (2 ") - - -	1,097
Bald cypress - - - - -	4,126
White cedar - - - - -	243
Oregon fir (10 species) - - - - -	276
	26,083 (Conifers.)
Gum (red) - - - - -	867
Oaks, white, (4 species) - - - - -	4,052
Oaks, black, (5 ") - - - - -	4,301
Hickory, - (5 ") - - - - -	3,011
Ash, - - (2 ") - - - - -	714
Elm, - - - (2 ") - - - - -	409
	13,354
Total, - - - - -	39,437

You will note that of northern timbers only the white and Norway pines have been tested in a small way, and of Oregon fir only a few random sticks sent in by an interested party; all others are southern.

Of these sticks only a portion on long leaf pine was compiled and worked up in bulletin 6. There are, however, now the entire data on southern pine worked up in manuscript. The average results will presently be stated in an eight-page circular, the status of the printing fund of the department preventing for the present the issue of a full bulletin. There will then still remain nearly as many data referring to other species undigested.

You will, however, understand that this test work differs from other testing done hitherto, in that it places reliance only on large numbers. Hence, for instance, the 276 tests on Oregon fir would hardly warrant us in drawing any conclusions, they are not better than any other tests, except that their moisture condition is noted, which is, to be sure, one important advantage.

On the other hand, for the southern pines we may claim to have such a series of data as to make it unnecessary for anybody else to test these timbers again; they cover such a large number under all sorts of conditions that absolute confidence in the reliability of the data for the range of strength in the species should be accorded to them.

At the same time the confusion existing in engineers' tables with regard to the kind of pine (names or species) should not be permitted any longer, especially since the various species promiscuously referred to as southern pine, yellow pine, pitch pine, etc., differ up to 20 per cent in average strength values.

But the mere establishment of the strength values does not exhaust the usefulness of these data; they were to be used, and will be used, if we are permitted, to establish such relationships as will lead to the formulation of rules of inspection—the most important object of these investigations, as a result of which the engineer or other consumer will be enabled to judge of the comparative value of the piece in hand.

For such purpose the existing data may sometimes not even prove sufficient and would have to be supplemented by new data obtained under special conditions.

One of the investigations of this nature directly interesting to the engineer is that on the relation of tests on large and small sizes. Here, too, our number of tests is still too small for safe generalization, although not less than 340 large columns and beams have been tested, with the interesting and readily explained result that for symmetrically cut beams (heart in center) the values are as large and sometimes larger than for the average of the small pieces cut from the same beams; while the columns give mostly but not always lower values, yet the results are so variable, that no trustworthy numerical data have been attained, the range in individual cases being as much as 50 per cent.

At present the work will be abandoned for the fiscal year, the allotment of funds having been exhausted, about \$40,000 in all having been spent so far. An attempt to work up the test results, at least for data of strength, will be made.

In the reading of the appropriations for this division for the next year the reference to this line of work has been left out and a discontinuance is probably contemplated. A bill making special appropriation for its continuance has been introduced in the senate (S. 1214), but its passage is exceedingly questionable.

I regret that I cannot report to you a more hopeful outlook.

ANNUAL REPORT OF THE PENNSYLVANIA RAILROAD COMPANY.

Following our practice herewith is presented the annual report of the president of the Pennsylvania Railroad Co. for the year ending December 31, 1895, including the general balance sheet. Than this company no railroad is more representative of American railroad practice in its best aspect and the study by railroad men in general of the affairs of this company as revealed by its reports from year to year, cannot fail of improving both the condition and practice of the railroad world. The report is as follows:

The gross earnings of the three grand divisions east of Pittsburgh and Erie, embracing the main line, United Railroads of New Jersey, and Philadelphia & Erie Railroad and branches, were.....	\$61,624,178.72
Expenses.....	44,510,456.31
Net earnings.....	20,113,722.41
To which add:	
Interest from investments.....	\$4,611,087.40
Rental of equipment, etc.....	452,372.98
	5,063,460.38
Gross income.....	\$25,179,982.79
Deduct:	
Rentals, leased and operated roads ..	\$8,896,061.39
Interest on funded debt.....	4,163,775.40
Interest on mortgages and ground rents, car trusts, taxes, etc.....	1,589,713.62
	14,649,550.41
Net income.....	\$10,530,432.38
From this amount the following deductions have been made:	
Payments account sinking and trust funds, and guaranty of interest on Allegheny Valley Railway bonds.....	\$568,711.87
Extraordinary renewals, etc.....	1,327,250.58
	1,895,962.45
Balance after above payments.....	\$8,634,469.93
Dividends of 5 per cent.....	6,465,011.25
	\$2,169,458.68
Amount transferred to credit of profit and loss for the year 1895.....	23,155,632.24
Previous amount to credit.....	\$25,325,090.92
Deduct amount of interest on funded debt accrued to January 1st, 1896, but not yet matured, less amount due from investments on the same date.....	\$826,537.11
Amount charged off in reduction of value of securities and settlement of sundry accounts.....	945,083.95
	1,771,621.06
Balance to credit of profit and loss December 31st, 1895.....	\$23,553,469.86

The preceding statements show that after having providing for all the fixed liabilities of your company, and expending over \$1,300,000 in improving its property, there remained the sum of \$8,634,469.93, out of which were declared dividends of 5 per cent, leaving \$2,169,458.68 to be carried to the credit of profit and loss account. In view of the fact that the low rates prevailing on both passenger and freight traffic for the past few years continued during 1895, it would appear that under any reasonable conditions your property will make fair returns to its shareholders.

It had not previously been the custom in stating your accounts at the end of the year to charge up the amount of accrued interest on bonds and other obligations of your company to the first of January following, or to take credit for the amount of income that matured upon securities held by your company on that date, but your board has now deemed it proper that both these amounts should be taken into your accounts for the year. It will, therefore, be seen that there has been debited to profit and loss the sum of \$826,537.11, being the difference between these two amounts, in addition to which a reduction has been made in the value of some of the securities held by your company, and in settlement of old accounts, making a total charge to profit and loss of \$1,771,621.06, and leaving \$23,553,469.86 to the credit of that account.

SINKING FUNDS.—Under the provisions of the consolidated mortgage of the company, \$324,780 were set apart on the 1st day of July last, out of the net income, as a sinking fund for the redemption of the outstanding bonds secured by that mortgage. None of the series of bonds to which the sinking fund was applicable could be purchased under the terms of the trust, and the amount was placed to the credit of the trustees for investment under the terms of the mortgage. There are \$4,307,956.91 in securities and cash in the fund for the redemption of these bonds. The trustees of the sinking fund for the redemption of the trust certificates issued for the purchase of the shares of the capital stock of the Philadelphia, Wilmington & Baltimore Railroad Co. were not able to purchase any of these certificates during the past year. The total amount so purchased and cancelled to Dec. 31, 1895, is, therefore, \$2,298,000, leaving outstanding \$7,702,000.

The trustees of the sinking fund for the redemption of the 4½ per cent Collateral Trust Loan were not able to obtain any of these securities during the year at the limit fixed in the agreement. The amount of this loan outstanding Dec. 31, 1895, is \$9,900,000.

Under the provisions of the 4 per cent equipment trust gold loan, there was paid to the trust during 1895, for the sinking fund, the sum of \$136,400. The trustee was unable to obtain any of these bonds at the price fixed in the lease, and in accordance with the terms thereof the whole amount has been invested in additional equipment.

FUNDED DEBT.—The amount of funded debt, including mortgages on real estate and ground rents, at the close of the year was \$87,658,910.72, being an increase of \$4,902,674.73, accounted for as follows:

Consolidated mortgage 3½ per cent sterling bonds issued, £1,000,000, equivalent to ..	\$4,850,000.00
Increase in mortgages and ground rents ..	52,674.73
Total ..	\$4,902,674.73

CAPITAL STOCK.—The amount of capital stock outstanding at the close of the year was \$129,301,550, an increase of \$3,350, due to the conversion of that amount of the scrip dividend declared in May, 1893.

SECURITIES OF OTHER CORPORATIONS.—The entire cost of the securities of other corporations now held by your company is \$118,035,905.87. The direct revenue received therefrom was \$4,353,987.10, the decrease as compared with 1894 being due to the generally reduced income from investments. Notwithstanding this, these securities continued to produce nearly 4 per cent upon their cost, and more than provided for the interest on your funded debt.

CAR TRUSTS.—No further issues of these securities were made during the year, and no series thereof matured.

The total number of cars provided under the car trust system is 57,997.

Total amount of certificates issued therefor, \$30,644,000.00
Amount redeemed .. 25,112,000.00

Balance of certificates outstanding December 31, 1895 .. \$5,532,000

The amount expended upon the main line and branches, and charged to capital account during the year, was \$607,858.95, the expenditure being entirely for additional freight cars and real estate, all other extraordinary outlay on that portion of your property having, as already stated, been charged against the general income of the year. The amount expended in construction on branch and auxiliary lines was \$1,936,741.23. The principal items of this expenditure were the extension of double tracks on the Pittsburgh, Virginia & Charleston Railway, made necessary by the development of the manufacturing industries on that line; the extension of the Fairhill Railroad, a short branch in the northern part of the city of Philadelphia, built for the purpose of furnishing increased facilities for local freight traffic; and the construction of what is generally known as the Delaware River Bridge, near Frankfort, Philadelphia, the purpose of which was fully explained in the last annual report. This latter undertaking in now rapidly approaching completion, and will be open for business during the coming summer. The work of elevating the tracks in the city of Elizabeth, New Jersey, with the exception of one bridge, is completed, and the policy of eliminating grade crossings by the construction of overhead or undergrade bridges is being continued wherever it can be done with due regard for economy, and the local authorities properly co-operate toward reaching this result.

At the close of the year your board deemed it advisable to place under contract several extensive improvements upon your main line, among which may be noted the straightening of the line at Kinzer's, on the Philadelphia division, covering a distance of about 5 miles; the revision of the Harrisburg, Portsmouth, Mt. Joy & Lancaster Railroad, in the borough of Mt. Joy, whereby all the grade crossings at that point will be eliminated, together with an improvement of the alignment of the same road a few miles further west; and also several minor changes in the valley of the Juniata, on the Middle division. The two most notable changes on the Pittsburgh division are first, on that portion of your road on the western slope of the Allegheny Mountains, which virtually amounts to a rebuilding of more than four miles of road at an estimated cost of \$700,000, whereby the present sharp curvature between Lilly's and Portage will be eliminated and a practically straight line substituted therefor; and second, a revision of the line at a point near Greensburg, which involves the construction of a new tunnel, 1.1 mile in length, and will result in the saving of a considerable distance as well as a material decrease in curvature. These improvements will require an outlay of nearly \$2,000,000 and will be actively prosecuted during the present year, should such a course be warranted by the general condition of the manufacturing and commercial interests. The returning prosperity of the industries of the country having made advisable an increase in your equipment, contracts have been entered into for the construction of about 8,000 cars for your system, some of which have been delivered, and the remainder will be put in service during the present year.

The number of tons of freight moved on the three grand divisions east of Pittsburgh and Erie in 1895 was 78,259,526, an increase of 13,561,832, or 21.00 per cent; the number of passengers was 37,452,437, a decrease of 1,143,723, or 2.96 per cent. The average distance traveled by each passenger in 1895 was 19 miles, an increase of one mile.

The other large railroad companies east of Pittsburgh and Erie in which your company is interested, show increased earnings due to the general business improvement throughout the year. Detailed statements of their operations will be found in their respective annual reports, as well as in the pamphlet report of your company. The total amount of coal mined during the year by the four coal companies, was 2,208,234 tons, a decrease of 89,491 tons.

LINES WEST OF PITTSBURGH.

On the lines west of Pittsburgh operated by the Pennsylvania Company and the Pittsburgh, Cincinnati, Chicago & St. Louis Railway Company the result was as follows:

Earnings of Pennsylvania Co. ..	\$20,888,964.08
Expenses ..	12,586,335.21
Leaving net earnings ..	\$8,302,628.87
Rental, interest, etc. ..	7,383,364.04
Net profit on Pennsylvania Co.'s lines ..	\$919,264.83

Earnings of Pittsburgh, Cincinnati, Chicago & St. Louis Railway ..	\$18,135,126.11
Expenses ..	13,166,364.94

Leaving net earnings ..	\$4,968,761.17
Rental, interest, etc. ..	3,678,075.33

Net profit on Pittsburgh, Cincinnati, Chicago & St. Louis Railway Company's lines ..	\$1,290,685.84
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Net profit on lines directly operated west of Pittsburgh ..	\$2,209,950.67
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The other lines west of Pittsburgh, on account of which your company has assumed direct obligations, or in which it is largely interested through ownership of securities, are the Cincinnati & Muskingum Valley Railway; Waynesburg & Washington Railroad; Pittsburgh, Chartiers &

Youghiogheny Railway; Cleveland & Marietta Railway; Grand Rapids & Indiana Railroad, and roads operated through its organization; Toledo, Peoria & Western Railway; and the Terre Haute & Indianapolis Railroad, and roads operated through its organization.

The aggregate gross earnings of these roads were ..	\$8,958,384.51
Expenses ..	7,401,132.59

Net earnings ..	\$1,557,251.92
Deduct rental, interest, etc. ..	1,868,170.31

Loss ..	\$310,918.39
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Of this loss the Pennsylvania Railroad is responsible for ..	\$222,084.57
Which deducted from the profit shown above ..	2,209,950.67

Leaves a net profit on all lines west of Pittsburgh for 1895 ..	\$1,987,866.10
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These lines show a marked improvement as compared with 1894, each of the two systems west of Pittsburgh showing a net surplus, after meeting all liabilities, of about \$1,000,000. This was largely due to the northwestern system to the prosperous condition of the iron industry. The tonnage and mileage were greater than for any previous year in their history.

The amount expended on account of construction, equipment and real estate during 1895 on the lines west of Pittsburgh was \$2,053,657.91.

The larger portion of the expenditures for capital account on these lines was for additional equipment, to meet the demands of the traffic and provide further facilities for the through business. The main items of construction were the widening for double track of the tunnels on the Pittsburgh division of Pittsburgh, Cincinnati, Chicago & St. Louis Railway; the increase of double track on the Western division of the Pittsburgh, Fort Wayne & Chicago Railway; and the revision of the line of the Cleveland & Marietta Railway.

The Newport & Cincinnati Bridge Company also expended a large sum on the rebuilding and improvement of the bridge over the Ohio river at Cincinnati. The masonry is entirely finished and the approaches are under construction, and the new bridge, which will carry not only the railway, but also furnish facilities for trolley and wagon traffic, and for foot passengers, will be completed during the present year.

FUNDED DEBT.—In view of the fact that a large amount of the bonds on your western line bearing seven per cent interest was approaching maturity, it was deemed wise to take advantage of the exceptionally favorable conditions prevailing in the money market during the past year, by selling \$3,000,000 of the consolidated mortgage bonds of the Pittsburgh, Cincinnati, Chicago & St. Louis Railway Company held in the treasury of the Pennsylvania Company, and use the proceeds thereof for construction and equipment purposes, and in anticipating, as far as practicable, the payment of the obligations referred to. These bonds were issued as of November 1, 1895, bearing 4 per cent interest, maturing 50 years from date, and are guaranteed, principal and interest, by the Pennsylvania Company.

The number of tons of freight moved on the lines west of Pittsburgh was 55,155,249, an increase of 11,235,771. The number of passengers was 17,111,177, an increase of 332,361.

The Gross earnings of all lines east and west of Pittsburgh for the year were \$132,720,811.66, operating expenses, \$92,859,286.66, and net earnings, \$39,861,525.00. There were 160,410,144 tons of freight moved and 75,052,479 passengers carried.

GENERAL REMARKS.—There has been paid to the managers of the trust created October 9, 1878, by the company, to December 31, 1895, the sum of \$4,495,190.91. The total income therefrom has been \$5,549,955.07, and on that date securities amounting at par to \$9,938,265 were held in the trust, yielding an interest of 5.07 per cent for the year. There was appropriated to the trust for the year 1895 the sum of \$87,216.87.

This trust, in pursuance of the purpose for which it was created, has purchased from time to time a portion of the bonds of the American Steamship Company, which mature October 1, 1896, and the maturing coupons on the entire issue at the regular interest periods. As there remains no property of that company to provide for the payment of these obligations, they will necessarily have to be charged against the principal of the fund. This same policy is being pursued as to the interest on the bonds of the Pennsylvania Canal Co., which is also guaranteed by your company. The payment of these large and practically unsecured obligations is the first direct benefit accruing from the creation of the trust, as they would otherwise have to be met out of your current revenue.

The assets of the insurance fund on hand at the end of the year were \$3,779,701.15, being an increase of \$310,891.78 over the previous year.

Interest in the employees' relief fund continues to increase, the membership at the close of the year, 36,432, being the largest since its establishment. During the year the members contributed \$641,849.12, while your company and its affiliated lines, in addition to the payment of \$98,548.53 for operating expenses, also contributed \$36,632.55 for extra benefits to members whose disability had continued for more than 52 weeks, and who were, therefore, no longer entitled to regular benefits from the fund. The total receipts of the fund, including interest and other small items, were \$790,174.62, which, with the balance on hand at the beginning of the year, \$230,600.23, made an aggregate of \$1,020,774.85, out of which \$254,298.64 were distributed as death benefits, being an average in each case of about \$575, and \$337,197.33, in cases of disability arising from sickness and accident. After meeting all its obligations for the year, and providing for unadjusted claims, a balance of \$247,498.02 remained to the credit of the fund.

The number of employees who availed themselves of the benefits of the employees' saving fund continued to increase, there being 4,513 at the end of the year, as against 4,112 in 1894. The amount received from depositors during 1895 was \$497,591, and the balance in the fund, at the close of the year, was \$1,578,884.37. Of this amount \$1,500,000 have been invested in 4 per cent securities.

On account of the favorable conditions prevailing in the money market, already referred to, and the near maturity of a large amount of bonds upon lines in which you are largely interested, it was thought wise to sell £1,000,000 of your consolidated mortgage bonds, dated July 1, 1895, bearing 3½ per cent interest, and maturing 50 years from date, and thus secure the funds to meet these obligations and for construction and equipment purposes. It is a gratifying evidence of the high credit enjoyed by your company that it was able to place these bonds at a lower rate of interest than that borne by any security which it has heretofore offered in the market. Your company also joined the Allegheny Valley Railway Company in a sale of \$5,000,000 of its 4 per cent general mortgage bonds, of which \$4,000,000 were used by that company to provide for the payment of a like amount of its 7 3-10 per cent bonds, maturing March 1, 1896, and the proceeds of the remaining \$1,000,000 which were owned by your company, were applied to your own capital requirements. By the funding of the 7 3-10 per cent bonds referred to, the Allegheny Valley Railway Company secures a reduction of \$132,000 in its annual interest charges. In accordance with the agreement of reorganization of that property, your company guaranteed the payment of these bonds, principal and interest.

In pursuance of a policy which had received the careful consideration of your board, the London Joint Stock Bank, Limited, with which your company has for many years maintained intimate business relations, was appointed your financial agent in London, on March 27, 1895. Through the establishment of this agency the English shareholders now receive their dividends on the same date as the American shareholders, and at their full equivalent in sterling.

The continued unsatisfactory condition of the transportation interests of the country has been fully recognized, not only by those having the management thereof, but by the general public. After careful consideration of the entire subject, an organization known as the Joint Traffic Association, has been formed, in the belief that, through its instrumentality, not only could substantial economies be enforced in the administration of the service, but stability and uniformity of rates secured to the public, and the violent fluctuations prevented which tend alike to disturbance of values and unjust discrimination. While sufficient time has not elapsed to thoroughly test its workings, yet enough has been accomplished in the correction of evils to demonstrate its value, not only to the railroads but to the public, and to justify the belief that to it, or some like organization, the Interstate Commerce Commission must look for the potent agency to enable it to force the provisions and secure the results sought to be accomplished by the passage of the interstate commerce act. Mr. David S. Gray, for many years manager of the Union Line, has been appointed representative of this company on the board of managers, which has the active administration of the affairs of the association.

GENERAL BALANCE SHEET.

DECEMBER 31, 1895.

Assets.

Road and Equipment.

Cost of road, including the cost of the Harrisburg, Portsmouth, Mt. Joy and Lancaster Railroad, represented by the guaranteed capital stock and bonds of said company (\$1,882,550).....	\$54,614,179.07
Real estate.....	20,142,993.19
Equipment.....	\$40,053,221.87
Equipment covered by 4 per cent Equipment Trust Gold Loan, Girard Life Insurance, Annuity and Trust Company, Trustee:—	
Account Penna. R.R.Co. \$1,961,936.69	
Account Penna. Co.....	1,610,000.00
	3,571,936.69
	43,645,158.56
	\$1,840,239.42

Securities—Cost of.

Stock of railroad corporations.....	\$73,713,702.46
Bonds of railroad corporations.....	33,628,955.77
Stocks and bonds of other corporations.....	10,693,247.64
	118,035,905.87

Mortgages and ground rents receivable.....	103,000.00
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Appraised value of securities not disposed of, received with the lease of United New Jersey Railroad and Canal Co.....	3,283,461.25
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Current Assets.

Due for advances for construction and other purposes.....	\$7,183,599.58
Bills receivable.....	565,115.81
Due from agents and superintendents.....	3,181,322.25
Miscellaneous assets.....	1,629,640.11
Materials on hand.....	3,021,430.90

Cash:—

Deposits of Allegheny Valley Railway Co. to redeem its 7 3-10 per cent bonds.....	\$2,095,307.01
Balance proceeds sale consolidated mortgage 3½ per cent sterling bonds.....	3,976,692.99
Balances with London Joint Stock Bank, Limited, and others for payment of interest.....	2,075,584.80
In hands of treasurer.....	6,639,404.84
	14,786,989.64
	30,368,998.29

Sinking Funds.

Pennsylvania Railroad Consolidated Mortgage Sinking Fund.....	\$5,339,800.00
Less bonds redeemed and cancelled.....	1,771,980.00
	\$3,567,820.00

Managers of trust created October 9th 1878.....	4,495,190.91
	8,063,010.91
Insurance fund.....	19,030.00

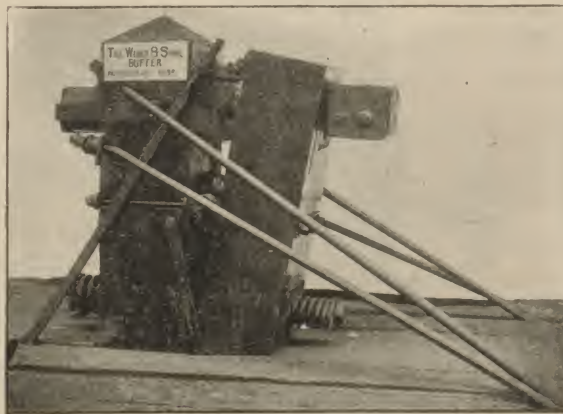
Total.....	\$278,265,807.74
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Liabilities.

Capital stock.....	\$129,301,550.00
Funded debt:	
General mortgage bonds, 6 per cent, due 1910.....	\$19,997,820.00
Consolidated mortgage bonds, 6 per cent, due 1905.....	\$27,480,020.00
Consolidated mortgage bonds, 5 per cent, due 1919.....	4,998,000.00
Consolidated mortgage bonds, 4 per cent, due 1943.....	3,000,000.00
Consolidated mortgage bonds, 3½ per cent, due 1945.....	4,850,000.00
	40,328,020.00
Navy Yard mortgage bonds, 5 per cent, due 1901.....	1,000,000.00
Collateral trust loan, 4½ per cent, due 1913.....	9,900,000.00
Equipment trust loan, 4 per cent, due 1914.....	2,728,000.00
P. W. & B. R. Co. stock trust certificates, 4 per cent, due 1921.....	7,702,000.00
First mortgage real estate bonds, 4 per cent, due 1923.....	2,000,000.00
Mortgages and ground rents payable.....	4,063,070.72
	87,658,910.72
Guaranteed securities under lease Harrisburg, Portsmouth, Mt. Joy & Lancaster Railroad	
Capital stock.....	\$1,182,550.00
First mortgage 4 per cent bonds.....	700,000.00
	1,882,550.00
Appraised value of securities not disposed of, received with the lease of United New Jersey Railroad & Canal Company.....	3,283,461.25
Current Liabilities:	
Pay rolls and vouchers.....	\$6,233,449.80
Net traffic, balances due other roads.....	889,205.41
Due controlled companies, other than traffic balances.....	9,374,748.59
Due Allegheny Valley Railway Co. amount on deposit for redemption of its 7 3-10 per cent bonds, March 1st, 1896.....	2,095,307.01
Due Employees' Saving Fund.....	80,997.36
Due Relief Fund, current and surplus accounts.....	309,792.45
Due Insurance Fund.....	65,227.16
Interest accrued on Pennsylvania Railroad Company bonds.....	1,637,276.86
Interest on bonds matured and uncollected.....	53,026.92
Dividends uncollected by shareholders.....	48,385.89
Miscellaneous liabilities.....	981,358.86
	21,768,776.31
Sinking Funds:	
Sinking fund consolidated mortgage bonds, contributions to Dec. 31, 1895.....	\$5,339,800.00
Fund for purchase of securities guaranteed by the Pennsylvania Railroad Company, under trust created Oct. 9th, 1878.....	4,582,407.78
Pennsylvania Company, payments for leased equipment under Pennsylvania Railroad Co. 4 per cent equipment trust gold loan.....	183,000.00
Trustees' sinking fund consolidated mortgage, Pennsylvania Railroad Co.....	411,881.82
	10,817,089.60
Balance to credit of profit and loss.....	23,553,499.86
Total.....	\$278,265,807.74

A NEW BUMPING POST.

The accompanying illustration is taken from a photograph of a bumping post which has been recently installed in the passenger station at Polk and Dearborn streets, Chicago. The arrangement consists of two timbers and their braces. One of them rests upon the ties and is anchored thereto by means of two iron straps. This member is shown at the left in the illustration. The other timber is shorter than the first and is held by a hinged connection at its center, which allows the piece to swing under the impact of a train so that the top of the timber will move to the left and the bottom to the right. The buffers of the cars strike the block shown at the right near the top of the post and this block being



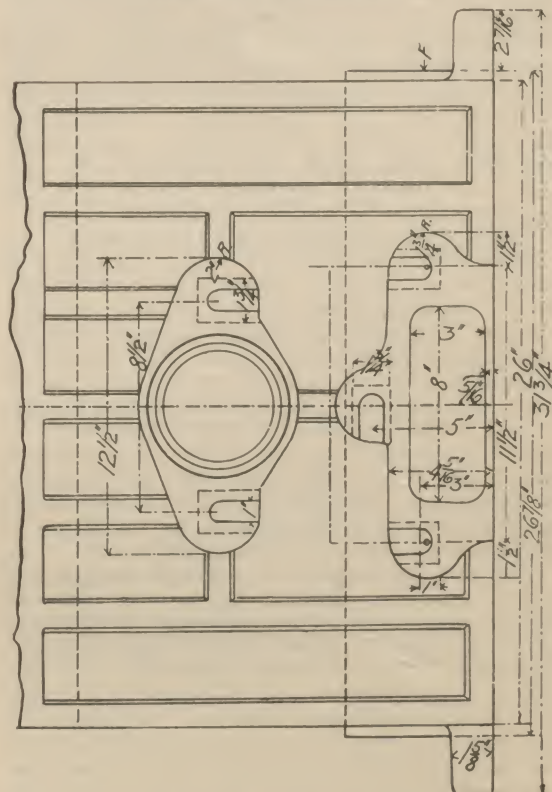
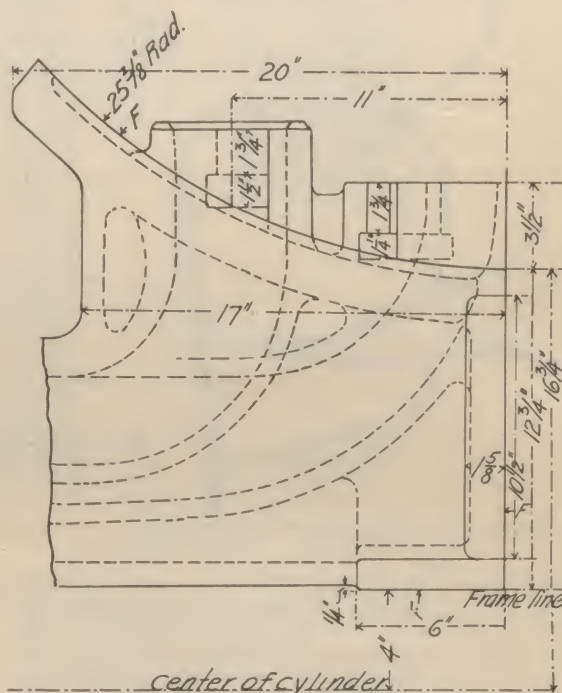
mounted upon the end of a horizontal rod communicates pressure to a coiled spring contained in the casing seen projecting at the left near the top of the upright post. This much of the blow received by a train is borne by the top of the post, but the movable piece comes into action as soon as the receiving block is struck and moving about the hinge the springs at the bottom of the post are compressed by means of the rod which passes through them and the two timbers, as shown in the illustration. The inclined rods extending to the right have their ends formed to fit in the angle bar space of the rails and

they are bolted directly to the rails by means of 1½-in. bolts. The other inclined braces extending to the left are used to hold the post against forward movement due to the tension on the front rods. These do not come into play except when the post is at rest.

The object of the swinging member is to transfer a portion of the thrust to the bottom of the post and a desirable effect is secured in increasing the elasticity. This post is set upon the ties and no digging being required it may be used in stations having concrete floors without disturbing the concrete. The device, as the illustration would indicate, is hardly out of the experimental stage, but the success attending the trials which it has received would indicate it to be satisfactory. The chief advantage is in the absence of sharp shocks to the trains stopped by it. It is the joint invention of Mr. J. A. Weber an employee of the Chicago & Western Indiana Railroad and Mr. M. G. Shime, yardmaster upon the same road.

SLOTTED ATTACHMENT OF STEAM AND EXHAUST PIPES TO CYLINDER CASTINGS.

The difficulty of removing steam and exhaust pipes when repairing locomotives which have been upon the road for some time, has led the mechanical officers of the Chicago & Northwestern Railroad to so design the cylinder castings as to permit of making these fastenings by means of headed bolts instead of studs, and a great saving of time and trouble is thereby effected in taking out the front end connec-



tions. The plan adopted consists of slotting the holes in the seats for these pipes and the method of doing this is shown clearly in the accompanying illustration in which the inside portion of the cylinder and saddle casting is shown. The illustration is sufficiently clear to be understood without further explanation. This arrangement adds slightly to the height of these seats, but this is not sufficient to interfere with the use of very low exhaust pipe when necessary. This is an improvement which will be appreciated by those who have been obliged to take down steam pipes which were hot or when the studs have become so badly set and corroded in the holes as to break off and necessitate drilling them out.

BALTIMORE & OHIO ELECTRIC LOCOMOTIVE—RESULTS OF TESTS.

The tunnel by means of which the Baltimore & Ohio Railroad was enabled to reduce the time of the "Blue Line" trains between New York and Washington and escape the trouble incident to the operation of a car ferry at Baltimore, has been described in THE RAILWAY REVIEW and the electrical equipment was illustrated in the issues of January 5 and July 20 of last year. It will, however, not be out of place to outline again the special conditions which made this work necessary and which caused the selection of electricity as a means of overcoming some of the difficulties surrounding the transportation through this tunnel.

The tunnel, which is the largest "soft dirt" tunnel ever built, extends, as indicated in Fig. 1, from the present Camden passenger station of the Baltimore & Ohio Railroad, a distance of 7,350 ft. north under the heart of the city. Beyond the northern portal, the Belt Line continues through a series of short tunnels and cuts for a distance of about five miles where it joins the old main line. The main tunnel has an up grade of 0.8 p. c. going north. The heavy work that would be required of steam locomotives hauling freight trains up this grade would oc-

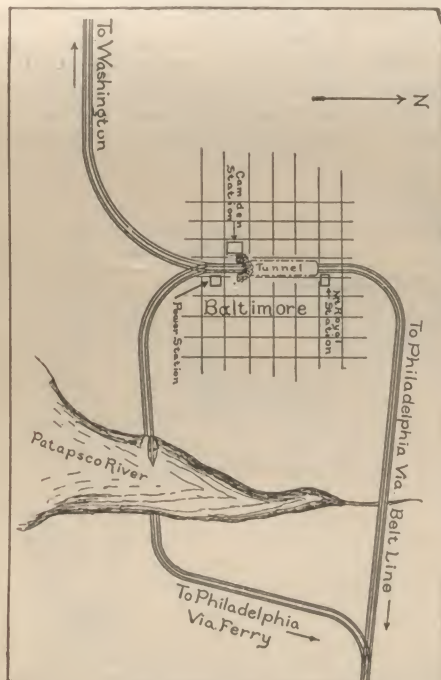


FIG. 1.—LOCATION OF TUNNEL.

casion the filling of the tunnel with so much gas and smoke as to seriously interfere with the passenger service. To show how true this is, it may be said that before the electric locomotives were put into service a few freight trains were run through the tunnel, but the result was that several men were asphyxiated, and it was therefore determined not to commence even a part of the regular freight service until the completion of the electric equipment. After the first electric locomotive had demonstrated its ability to do the work required of it, interest was awakened to ascertain its capabilities, and pulling tests were made, which were described in THE RAILWAY REVIEW of November 9, of last year. In these tests a drawbar pull of over 60,000 lbs. was recorded in pulling a train weighing 1,900 tons.

It may be of interest to know how the draw-bar pull exerted for each ampere of current put into the locomotive, was determined, and the following information has been received from the General Electric Company with regard to the tests. The Pennsylvania Railroad Company's dynamometer car was secured and coupled in between the electric locomotive and a train of known weight. The weight of each car in pounds had been accurately determined beforehand. The regular two mile haul up grade was then made. When the train was in the tunnel on the grade the pull was uniform, as was shown in the diagrams taken on the dynamometer car.

When no draw-bar pull was recorded the pen rested on its base line. The height or ordinate of the irregular curve at any point represented the draw-bar pull at that instant. Measuring the same in inches and subtracting a constant and then multiplying by 4,000, gave the draw-bar pull in pounds, i. e., every inch in height represented 4,000 lbs. The paper traveled under the pen at a rate proportional to that of the train. An irregular line above the base line, was the planimeter record, from which was determined the mean pull for any time. Having, then, the velocity, or the feet per minute and the mean pounds pull exerted during any period, the horse power developed was readily obtained.

Another line on the diagram showed the chronograph record, each of the small offsets in the line occurring every five seconds. For every hundred feet the train moved, the paper moved an inch. The distance in inches between any two of these offsets gave us readily the velocity of the train. Another line represented the time readings of current and voltage which were taken in the locomotive, a push-button in the locomotive being electrically connected with this recording apparatus. These readings were

numbered, so it was easy to tell the current at any time and location. Still another line showed a record of the different stations in the tunnel. From this we determined the location of the train at any time.

The first test showed (a) how the start was made on the down grade leading to the tunnel; (b) how after the train was fully started, the draw-bar pull dropped off; then (c) how it gradually increased as the train came on to the 0.8 p. c. grade in the tunnel; and (d) after the train was wholly on the grade, how even the pull was, until near the stop, when the grade increases to 1.2 p. c. Mr. Dunbar, of the Pennsylvania Railroad Co. in charge of the car, showed some diagrams of steam locomotive work under similar conditions, and it was seen that their amplitude of vibrations was considerably greater than those of the electric locomotive. This was undoubtedly due to the absence of the angle crank on the electric locomotive, and because its pull is uniform throughout the entire revolution of the armature. Most of the vibrations of the pen shown on these curves were due to vibrations of the dynamometer car.

From test No. 1 the total draw-bar pull in pounds was obtained, and, knowing the weight of train, we found the draw-bar pull to be 22 + lbs. per ton of

first figure and was very close to it, the slight difference found being due to one brake on the six cars being partially set during the first run and unknown to anyone.

The readings of current during the first run, also during the second, were taken. The difference of these should show the current required to haul the six cars switched off. Dividing the difference in the draw-bar pulls recorded in the two tests by the difference in the current recorded gives us exactly the net draw-bar pulls in pounds per ampere of current. This was 28.6 lbs.

It will be noted that by this method the current required to drive the locomotive was eliminated. To determine how much this was, and to check conclusions, the draw-bar pull in pounds recorded in the first test was divided by 28.6 and giving the current that should exert that net draw-bar pull. Subtracting this current from the current actually recorded on the locomotive would give the current required to drive the locomotive. It was found to require 144 amperes. As a further check the second test was calculated in the same way, and precisely the same results were obtained, i. e., 144 amperes. So at any time now when hauling a train with the four motors in series if the current indicated on the ammeter is taken and the 144 amperes needed for the

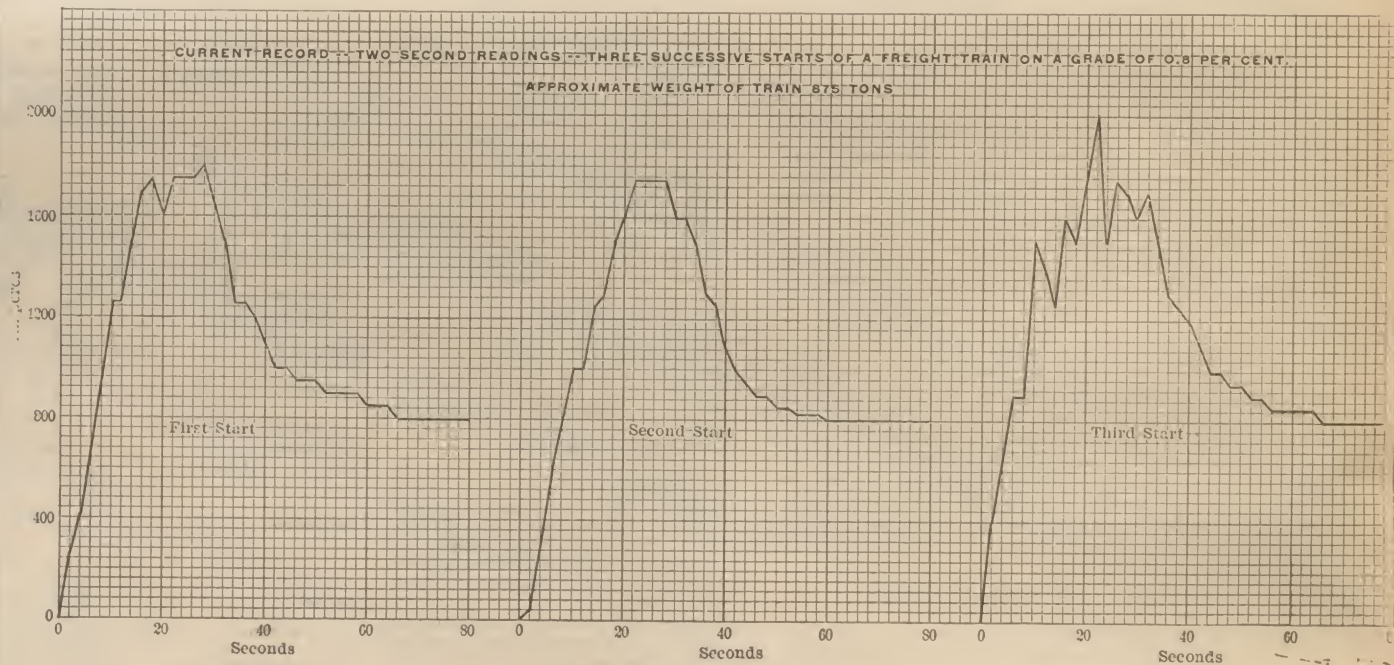


FIG. 2.—CURRENT RECORD.

weight. Subtracting the grade pull which, in the case of an 0.8 p. c. grade, is sixteen pounds, we obtained 6 + lbs. per ton as the train resistance. This confirms the usual allowances made for freight train resistance. These observations were taken in September, 1895, on a very hot day. During the past winter months the train resistance has increased, due, no doubt, to greater journal friction caused by thickened lubricants, and we find it to be from our records about 20 p. c. to 30 p. c. greater than in September.

Test No. 2 was made after we had switched off six cars. The run was made under similar conditions and the same character of observations was made. The difference in draw-bar pull of the two trains would naturally be the draw-bar pull necessary for the six cars switched off. The exact weight was known and thus it was possible to find what the draw-bar pull per ton was. It was a check on the

locomotive subtracted and the remainder multiplied by 28.6, the total net draw-bar pull in pounds may be found, and if we divide this by the draw-bar pull per ton we get the tons of load we are pulling.

From the results obtained above the current and draw-bar pull at any moment can be found while accelerating a train. The curves (Figs. 2 and 3), explain themselves very fully.

Mr. V. Herzenstein, a Russian railway engineer, estimates that the life of creosoted sleepers is as follows: On main lines creosoted pine lasts 15 years, oak 18 years, and beech 20 years.

A Chicago lawyer of a cynical disposition thus defines a promoter: "One who sells nothing for something to a man who thinks he is getting something for nothing."

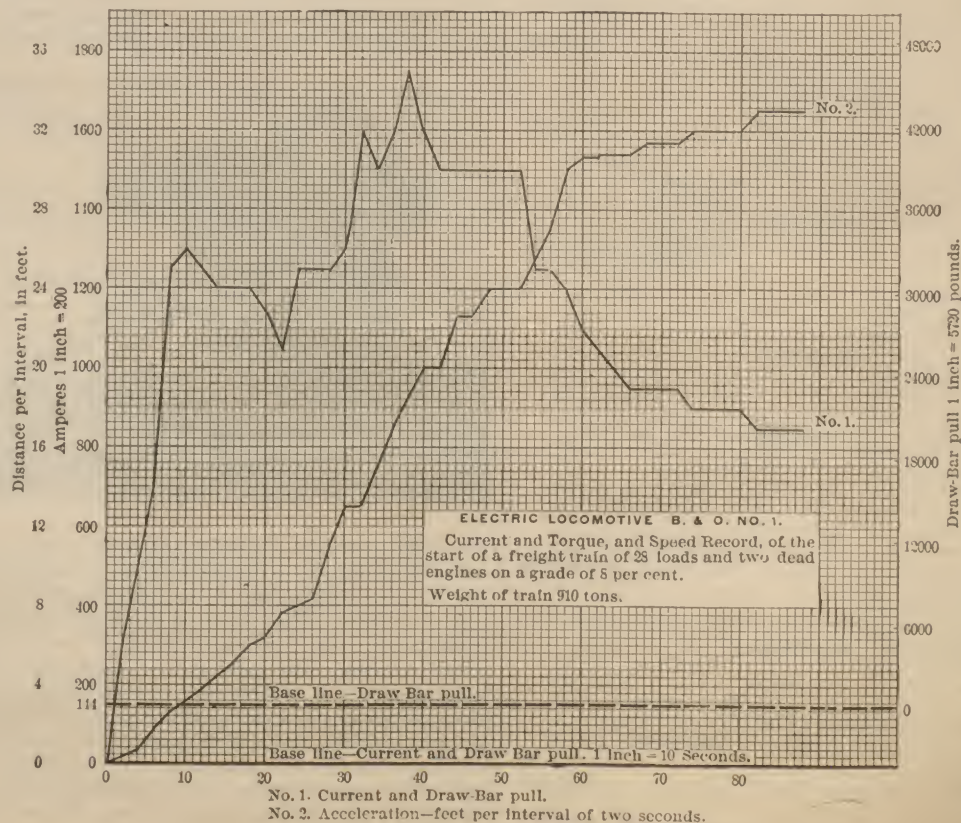


FIG. 3.—CURRENT AND DRAW-BAR PULL.

COMBINATION ORE AND GONDOLA CAR—DULUTH SOUTH SHORE & ATLANTIC RAILWAY.

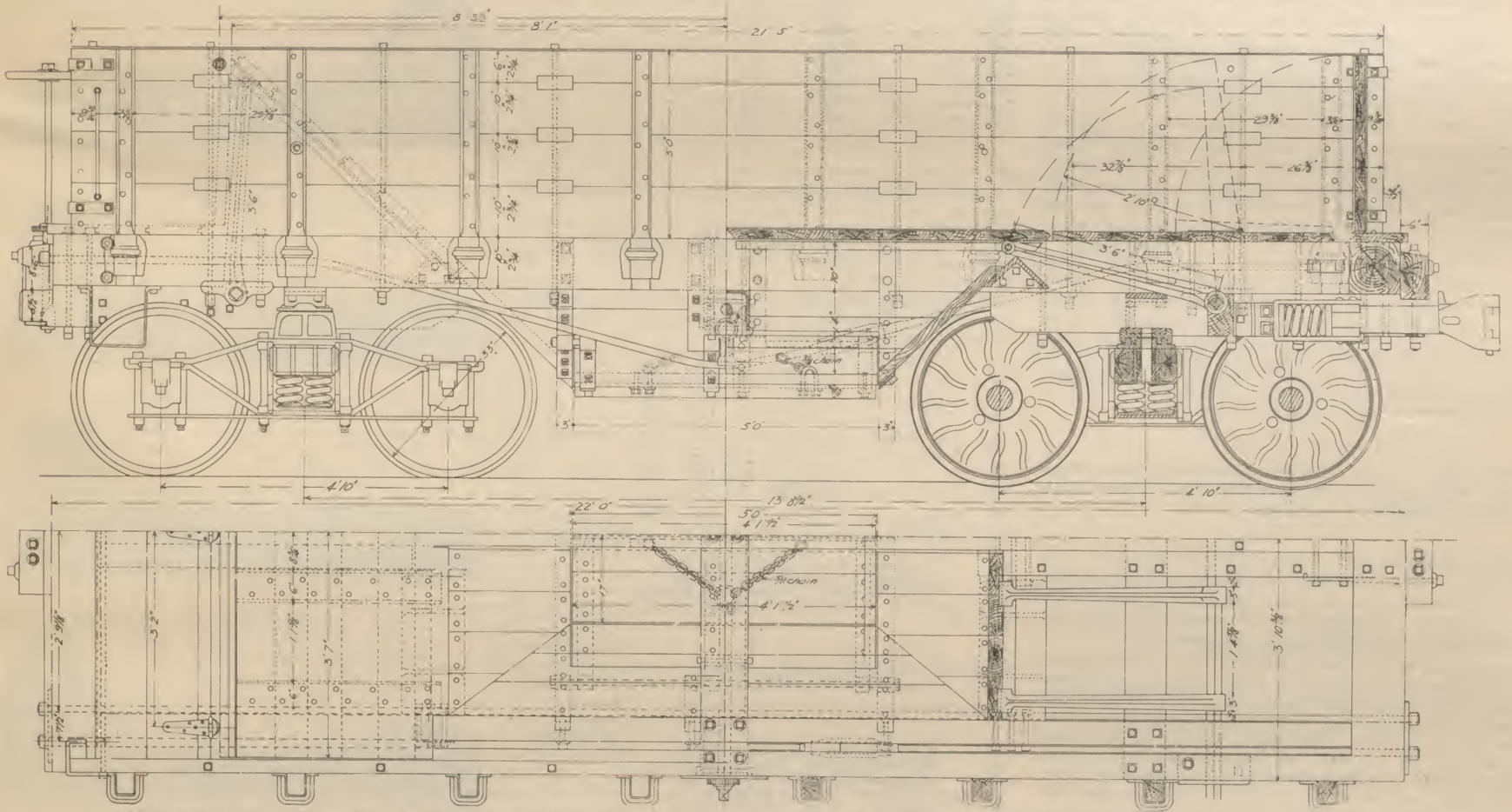
The Duluth South Shore & Atlantic Railway has had a combination ore and gondola car in use upon its lines for about a year and the success of the design is such that 600 cars have been ordered from the drawings and are now being built by the Michigan Peninsular Car Company of Detroit, Michigan. The drawings from which the accompanying illustrations have been made were received through the courtesy of Mr. J. J. Conolly master mechanic of the road.

Fig. 1, shows a half plan view and a half elevation and longitudinal section of the car. Fig. 2, gives a half cross section through the hopper, and Fig. 3, shows the method of attachment by the brake rig-

The construction of the hopper will be seen by referring to Fig. 1 in which it will be noticed that the sloping sides of the hopper are formed in two parts, the lower of which is constructed permanently and the position of which is not changed in transforming the car to a gondola. The upper parts of the inclines are swung on four heavy malleable iron arms which are mounted at their lower ends upon 2 in. square shafts held in boxes against the side sills of the car. These shafts are rotated by means of a large wrench and the inclines may be raised or lowered for either position. The doors of the hopper open outwardly, the hinge rods running parallel with the length of the car. They are opened and closed by chains wound up a 2 in. shaft which is mounted in a channel formed by placing two 4 x 6 in. angle irons together and securing them

which these defects may be charged to the owner are, in my opinion, plainer, and gotten up in better form than the rules proposed by the other clubs.

Rule 16 of the appendix to these rules reads: "When M. C. B. couplers of another make are placed upon a car the uncoupling arrangements shall be made operative. Cars equipped with M. C. B. couplers should be marked to show whether a draw-bar pocket, or stem attachment, is standard thereto, and whenever such attachment, or uncoupling arrangements, are changed, a defect card shall be applied." [The quotations are from the revisions proposed by the various clubs.—ED.] I think it should only be necessary to card for the rear end attachments, because in most cases where a coupler is changed it is necessary to change the uncoupling lever, and I think that if it is made operative on the coupler



COMBINATION ORE AND GONDOLA CAR—DULUTH, SOUTH SHORE & ATLANTIC RAILROAD—FIG. 1.—LONGITUDINAL VIEWS.

ging. The car is provided with a hopper for carrying ore and also with end gates. The sides of the hopper are so arranged that they may be brought up into the car to form a continuous flat floor to transform the car into a gondola, the object being to design a car which might be used for transporting ore during the ore shipping season and which without expense might be changed in the fall so as to permit of using it in the log and lumber trade. The length of the car is but 22 ft. over the end sills, this being limited by the spacing of the pockets on the ore docks. It carries from 27 to 30 tons of soft ore and from 30 to 33 tons of hard ore. This is an example of a combination car which is so designed as to be a good car in both capacities. Its success as a lumber car is said to be all that can be desired and there is no apparent reason why the same should not be said of it as an ore car.

by proper castings at the ends and at intermediate points. The movable inclines are plated upon the inside with No. 8 sheet steel and each incline is stiffened underneath by two, 2 x 6 in. channel irons. The location of these is shown in the plan view of Fig. 1.

The permanent floor extends 30 1/2 in. from the end sills at each end of the car. From that point a hinged section 2 ft. 10 in. wide extends out to meet the inclined sides when they are lowered into horizontal position. This hinged portion of the floor is raised into a vertical position so as to be out of the way of the malleable iron arms when they are raised. When the inclines come down they rest upon the side sills of the car, over which they lap sufficiently to form an ample bearing. The car has five sills, two at each side and one at the center, which are 10 in. deep by 5 in. wide. The sides of the car are 3 ft. high above the upper faces of the sills. The length of the box outside of the stakes is 21 ft. 5 in.

On account of the interference of the hopper it is found impossible to apply the air brakes in the usual manner for this class of car, and a special arrangement was designed using two 6 in. cylinders, the position of one of which is shown in Fig. 3. This arrangement consists of attaching the piston rod of the air cylinder directly to truck levers, doing away with the floating levers and long brake rods. This is perhaps the only way in which the rigging could be applied to these cars on account of the large hoppers in the short cars. The rigging is simple, and there is no complication added to the air apparatus, except that the connection from the triple valve runs to two small instead of to one large cylinder. There is but one triple and one reservoir. The 600 cars referred to are to be equipped with the Westinghouse air brake, the Trojan M. C. B. couplers, and pressed steel center plates. The truck columns, column slides, stake pockets and bottom brake rods are all of malleable iron. The capacity of the car is 50,000 lbs. and the journals are 4x7 in.

AN INSPECTOR'S CRITICISM OF THE REVISION OF THE INTERCHANGE RULES.

To the Editor of the Railway Review:

SIR—I have read over all of the proposed new rules by the different railway clubs, and I think that the rules proposed by the Western Railway Club are the best and easiest to understand. Their rules showing what defects are chargeable to the car owner, and the exceptions and conditions under

used, and the work done in a proper manner, this should be all that is required.

Rule 4 of the Central Club's arrangement gives defects of brakes which are chargeable to car owners: "From section 18 to section 39, except sections 34, 35, 36 and 37, unless caused by derailment or wreck. Section 34. cylinder or triple valve, of air brake cars not cleaned and oiled within 12 months, and the date of last cleaning and oiling marked on the brake cylinder."

"Section 35. Brake shoe slack on air brake cars not so adjusted that under full application the piston travel not less than 5 nor more than 9 in."

"Section 36. Brake on air brake cars not applying and releasing promptly, by proper handling of the engineer's valve."

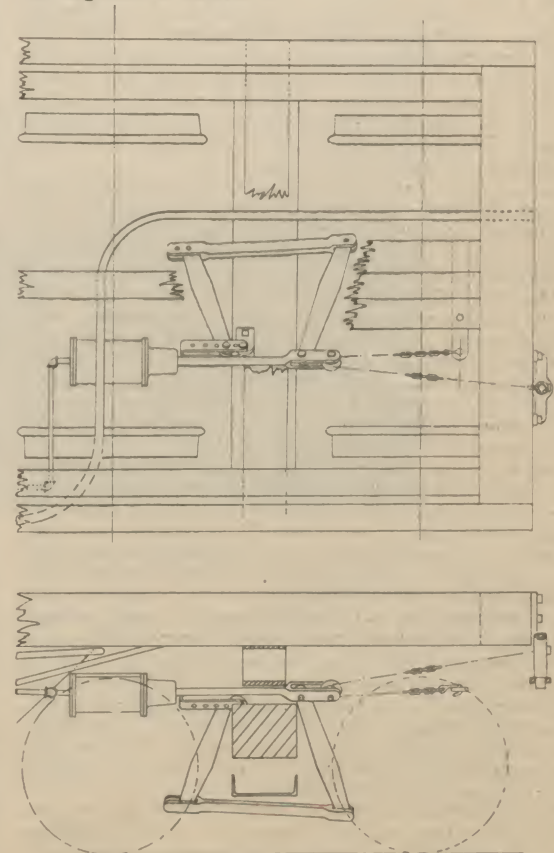


FIG. 3.—ARRANGEMENT OF BRAKES.

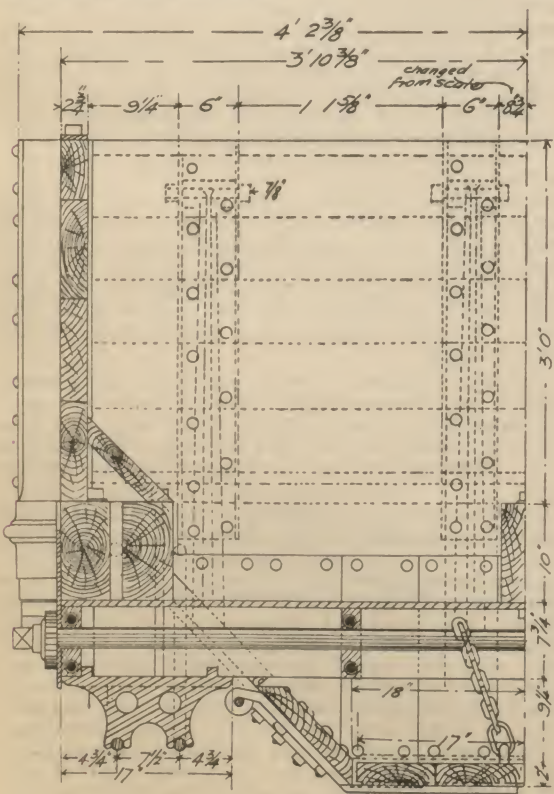


FIG. 2.—HALF CROSS SECTIONS.

"Section 37.—Triple valve and auxiliary not free from water."

My opinion is that these are also defects which should be charged to the car owner, unless damaged by carelessness or wreck.

Rule 3, section 39, by the Northwestern Railway Club, and the Central Club, and also the New England Club, reads: "Air brake cars not provided with two 1½ in. hose and couplings in good order, and properly secured in dummy couplings, when not coupled to other cars, chargeable to owner." My opinion is that this section should be changed, as there are large numbers of cars with 1 in. train pipe and 1 in. air hose; also, there are a number of railroads doing away with dummy couplings. I think this section should read something like the following: "Air brake cars must be provided with two 1 in. hose on 1 in. train pipe, or two 1½ in. hose on 1½ in. train pipe, in good order, and properly secured in dummy couplings, if the car is equipped with dummy couplings, when not coupled to other cars." The Western Railway Club's rule on this matter is about right, as per section 8, clause 22.

The rules should be made short and as plain as possible, so that there would be no difficulty for any inspector to understand them. If the rules are made long, with a lot of clauses and sections to them, some inspectors will be so confused that they will not know whether they are doing right or wrong half of the time.

INSPECTOR.

[It would be well if inspectors in general would make known their views as widely as possible before the June convention, and it is to be hoped that more of them will take up the subject and present their ideas as being the men who are to use the rules, they may materially assist in obtaining a sensible, concise and easily interpreted code.—Ed.]

WEAR OF TIRES ON PASSENGER ENGINES OF THE NEW YORK CENTRAL FOR THE PAST TWENTY YEARS.

The following has been received from Mr. P. H. Dudley, C. E., who is well known to readers of this journal on account of his work of designing steel rails and his writings upon the subject of rail sections and the wearing qualities thereof:

Comparing the weights upon the drivers a few years ago with those in present use shows an increase in the static or dead load of some 65 per cent. while the increased speed of the trains now produces dynamic effects more than double the static loads, yet by increasing the width of the head of the rails as they were renewed and the higher standard of track maintained, the rate of the wear of tires for the heavier locomotives has not increased, but on the contrary, decreased. In 1883 on the 65 lb. rails deep and narrow type of heads, drivers carrying 13,360 lbs., ran an average of 19,400 miles for a loss of 1-16 in. in thickness of the tires.

This was the second type of 65 lb. rails, the first one having been rolled in England and had a wider head. In 1884 the 5 in. pioneer 80 lb. rail was put in service, the head being 2 11-16 in. wide. Its use was yearly extended, and by 1889 locomotives on the Hudson division made nearly one-half of their mileage on the 80 lb. rails. Engines then carrying 17,600 lbs. per driver ran an average of 19,300 miles per loss of 1-16 in. in thickness of tire.

In 1891 passenger engines on the Hudson division made their entire mileage on the 80 lb. rails, while those on the Mohawk and Western divisions made about three-quarters of theirs on the same class of rails; drivers carrying 20,000 lbs. ran an average of 19,400 miles per loss of 1-16 in. in thickness of the tire. This refers to the loss by wear and returning for future service. In 1892 the 100 lb. rail, head 3 in. wide, was laid on the Harlem line, which carries the combined passenger traffic of the three railroads entering and leaving Grand Central Station, New York City. The renewing of the entire line of the New York Central & Hudson River Railroad from Mott Haven Junction to Buffalo and return with 80 lb. rail was completed in 1892. In 1894 the 100 lb. rail was laid from Spuyten Duyvil to Peekskill, making about one-quarter of the Hudson division laid with 100 lb. rails.

In June, 1895, I asked Mr. Wm. Buchanan, general superintendent of motive power and rolling stock, for the mileage of some of the class "I" engines running over the 80 and 100 lb. rails, and below will be found the entire list except for engine No. 903. When the class "I" engine was designed in 1889, the weight on each driver was 20,000 lbs., but as the 80 lb. rails were put into the track the weights have been increased to 22,000 lbs. The total weight of the locomotives in running service is 200,000 lbs. or over, 40,000 lbs. being upon the truck. The mileage of the tires only includes one turning since October, 1892, and ends March, 1895. Some of the engines, there were 43 in all, did not enter service until 1893 and others in 1894.

The list is so large, covering such a wide range of service, that it must show conclusively whether or not a broad flat topped rail increases or decreases the rate of wear of tires running over them. The 43 engines ran 3,706,567 miles and the total loss in thickness of tires in sixteenths of an inch was 160, or an average of 23,166 miles for a loss of each 1-16 in. of tire. Twenty-three of the engines which ran in part over the 100 lb. rails show an average mileage of 29,046 miles for each 1-16 in. loss in thickness of the tire. The mileage of 19,400 miles per loss of 1-16 in. in thickness shown by the light engines on the 65 lb. rails is now much exceeded by the heavier engines on the 80 lb. rails, the average mileage being 23,166 miles, and on the 100 lb. rails it will exceed the 29,046 miles, which over one-half the present engines now show by only making a part of their mileage on the wide rails.

The comparison between the wear of tires on the engines running the "Empire State Express," over the Hudson division, making one-fourth of the mileage on the 100 lb. rails, and the one running over the Western division ex-

clusively on 80 lb. rails is very interesting.

Engine 870 commenced the service for which the wear of the tires is shown May 25, 1894, and completed it December 21, 1895. The engines are double crewed, as is customary with all, and the mileage made per month, days worked and idle are shown in the following table:

Month.	Miles Run.	No of Days.		Remarks.
		Worked	Idle.	
May 25, 1894.....	1,332	5	1	Cooled down and boiler washed.
June.....	8,880	30		
July.....	9,176	31		
August.....	9,176	31		
September.....	8,880	30		
October.....	9,176	31		
November.....	8,880	30		
December.....	8,596	30	1	do do
January, 1895.....	8,584	31		
February.....	7,992	28		
March.....	9,188	31		
April.....	8,576	29	1	do do
May.....	9,200	31		
June.....	8,906	30		
July.....	8,880	30	1	do do
August.....	8,980	31		
September.....	8,880	30		
October.....	9,188	31		
November.....	8,870	30		
December 21, 1895	5,836	21		
	167,176	571	4	

Note—The fire was not drawn except on dates mentioned in remarks.

On Sunday's No. 870 ran the fast mail. This engine entered service April, 1890, and including December, 1895, made a total mileage of 525,467 miles, or an average for the entire time of 7,727 miles per month.

The following table shows the wear of tires of engines with 20,000 to 22,000 lbs. on drivers running on 80 and 100 lb. rails—open hearth steel.

No. of engine.	No. of miles run.	Driver.	Circumference, in feet.	Area of metal worn off per square inch.	Pounds metal lost per tire.	Pounds metal lost per 1000 miles run.	Remarks.
870	167,176	Left front.	20.41	0.630	43.61	0.261	Running on 80 & 100 lb. rails.
870		Left rear.	20.41	0.480	33.32	0.199	
870		Right front.	20.41	0.445	30.88	0.184	
870		Right rear.	20.41	0.380	26.28	0.157	
903	152,314		22.00	0.680	50.83	0.333	Running on 80 lb. rails, plaster cast of only 1 tire obtained.
Engines running on first pattern English 65 lb. rails, 1876, crucible steel tires, 15,000 to 18,000 lbs. on drivers, N. Y. C. & H. R. R. R.							
84	56,219	Left front.	18.06	0.242	13.81	0.247	Running on English 65 lb. rails, heads.
84		Left rear.	18.06	0.250	16.86	0.301	2 3-8 in. wide.
84		Right front.	18.06	0.270	16.58	0.296	" "
84		Right rear.	18.06	0.355	21.80	0.390	" "
86	73,647	Left front.	18.06	0.406	24.56	0.334	" "
86		Left rear.	18.06	0.403	24.74	0.336	" "
86		Right front.	18.06	0.400	24.56	0.334	" "
86		Right rear.	18.06	0.460	28.24	0.383	" "
New York & Harlem R. R., 1876.							
4	78,861	Left front.	17.28	0.440	25.85	0.261	" "
4		Left rear.	17.28	0.650	38.19	0.386	" "
4		Right front.	17.27	0.580	34.07	0.344	" "
4		Right rear.	17.28	0.660	38.40	0.368	" "

Loss per yard in circumference of tire, per 1,000,000 tons rolling contact on the rails.

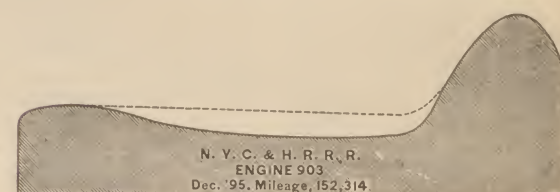
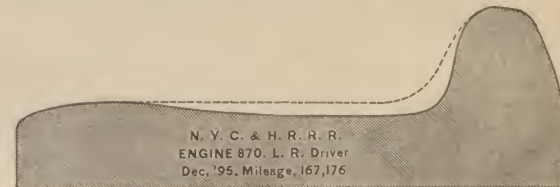
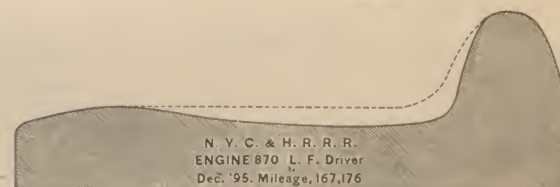
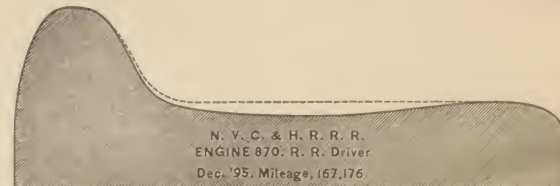
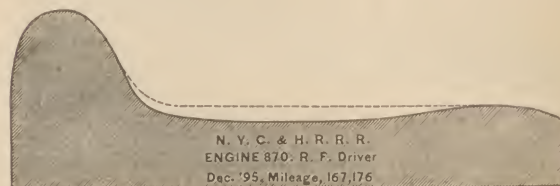
No. 870.....	0.042 lbs
No. 903.....	0.070 lbs
No. 84.....	0.121 lbs
No. 86.....	0.136 lbs
No. 4.....	0.132 lbs

The general dimensions of the class "I" engines are given in the following table:

Cylinder, diameter and stroke.....	19x24 in
Steam port.....	18x1½ in
Exhaust port.....	18x2¾ in
Bridges.....	1½ in. wide
Valves—	
Style.....	Richardson patent balance
Travel.....	5½ in
Outside lap.....	1 in
Inside lap.....	none
Exhaust nozzle, double, diameter.....	3½ in
Smokestack, straight inside.....	16 in
Boiler—	
Diameter, smallest ring.....	58 in
Material.....	½ in. steel
Pressure per square inch.....	170 lbs
Fire-box—	
Length, outside.....	105½ in
Width.....	40½ in
Area.....	27.3 sq. ft
Heating surface.....	150.8 sq. ft
Flues—	
Number.....	268
Outside diameter.....	2 in
Length between sheets.....	11 ft 11 in
Heating surface.....	1670.7 sq. ft
Total heating surface.....	1821.5 sq. ft
Weight of engine in working order.....	120,000 lbs
Weight on drivers.....	80,000 lbs
Weight on trucks.....	40,000 lbs
Weight, maximum tender loaded.....	80,000 lbs
Kind of brake.....	Westinghouse Air Brake Co.
Driving journals.....	8½x10½ in
Engine truck journals.....	6x10 in
Tender truck journals.....	4½x8 in
Crank pin journals, main.....	5½x5½ in
Crank pin journals, side.....	4½x3½ in
Ratio, heating to grate surface.....	0.015
Square feet of heating surface to one cubic foot of cylinder volume.....	232
Tractive force per pound M. E. P.....	111.07
Adhesion to tractive force.....	0.20
Total length of locomotive over all.....	57 ft. 1½ in
Engine truck wheel base.....	6 ft. 8 in
Center of rear tender wheel to center of driver.....	8 ft. 9 in
Wheel base of drivers.....	8 ft. 6 in
Center of rear driver to front truck wheel.....	7 ft. 7 in
Wheel base of tender trucks.....	4 ft. 5 in
Space between tender trucks.....	6 ft. 4½ in
Diameter of drivers.....	78 in

Diameter of engine and tender wheels.....	36 in
Tank, water capacity.....	3,587 gals
Tank, coal capacity.....	6¾ tons

The accompanying illustrations show the approximate wear as obtained by plaster casts after the mileage indicated on them had been made by the engines.



Engine No. 903 hauled the "Empire State Express" on the western division from April 3, 1894 to December, 3, 1895, total mileage 152,314. Of the four tires of engine No. 870, the left front one, was physically the softest and shows the most wear as seen in the accompanying illustrations. Both front drivers show increased wear over the rear ones from crushing the sand when first applied to the rails, and is more noticeable than on the crucible steel tires of the lighter engines of which I took plaster casts many years since. Ross Meehan shoes were applied to the drivers covering the full tread and flange of all drivers for both engines. On No. 870 considerable wear was produced on the outside of the flanges of the left side drivers, which is not included as it was not produced by the rails.

The wear of tires per 1,000,000 tons rolling contact on the rails for the amount of metal lost as shown by plaster casts would be influenced by many conditions which need not be considered here, yet the results point to the same general fact that by widening the top of the rail and giving it a larger top radius the rate is decreased, notwithstanding an increased weight is carried upon the drivers. The top radius of the pioneer 80 lb. rail is 12 in. with 5-16 in. corner radii, and for the 80 and 100 lb. rails laid in 1892 and since, it is 14 in., and corner radii of 5-16 in. The practical results of introducing the broad topped stiff rails show a decreased wear of tires, frogs, rails, ties, and expense of minimum maintenance while the speed and train loads have been largely increased. The standard freight train load of the New York Central & Hudson River Railroad on the 80 lb. rails is 50 loaded 60,000 lbs. capacity cars, making a gross load of 2,250 tons, forming a train 2,000 ft. long, which runs 150 miles in six to eight hours. The train load has more than doubled from the old 65 lb. rails.

The broad thin type of head is making rapid progress abroad. Dr. Haarmann at his Osnabruck works, Germany, has introduced several sections, while many are being rolled in England for India and Australia. My 80 lb. section has recently been rolled in England for two Canadian lines.

While the thin wide head and stiff type of rails is now generally recognized as the most economical form, the pioneer 5 in. 80 lb. rail met with decided opposition as being heavier and stiffer than was needed. Its introduction was largely due to the persistent efforts of Mr. J. M. Toucey, then general superintendent but now general manager of the New York Central & Hudson River Railroad. The rail once in the track made friends and had strong advocates for the value of stiffness in a section was recognized, the principle being utilized by many railroads. It is not weight alone but stiffness as well which gives value to a section. It marked an epoch in railway progress, and while the advantages of a broad head and stiff 5 in. rail have exceeded expectations there are still greater values to be obtained by the use of the broader head and stiffer 100 lb. rail.

COLORS FOR NIGHT SIGNALS.*

The committee appointed to investigate the subject of colors for night signals has spent a great deal of time and made a number of experiments in the effort to find a satisfactory practical solution of the problem involved, and begs leave to submit the following report:

It seems best to first outline the different arrangements now in use for giving information at night by means of signals. The system most generally adopted in this country, and which is standard upon nearly all of the most important trunk lines, employs the ordinary semaphore signal with single spectacles, and the following colors: Red for "danger", green for "caution", and white for "clear". An arrangement of lights has been made and is in use upon three roads in New England, which employs three lamps upon each post, and blinders are placed upon the semaphore blade and the up and down rod in such a way as to produce what might be termed semi-position indications: two horizontal white lights indicate a horizontal position of the arm, and two vertical lights an inclined or safety position.

Another arrangement consists of a double spectacle for the home signal, which is provided with a red and green glass, which in the danger position exhibits a red light, and in a clear position a green light. Upon the distant signal a double lamp is used, so that one flame illuminates two windows at about 9 in. centers placed horizontally. A blinder and a red glass are provided in the spectacle casting, so arranged as to give a caution indication by means of a red light horizontally beside a green light, and a clear indication by a green light only. This is known as Carter's arrangement, and it is used upon the Chicago & Northwestern Railway, it being the design of Mr. E. C. Carter, principal assistant engineer of that road.

The following arrangement has been adopted upon another road: Red for "danger", green for "clear", and white for "caution". This has not been used to any great extent, but one road being known to have adopted it, and that a small one.

The system most used in England employs but two colors, namely, red for "danger" and green for "clear," there being no caution signal in that country as we understand and use the term here. The English distant signal gives the same indications as the home. It is not a stop signal and gives a cautionary indication merely by its being known to be a distant signal from its location. Recently, however, a necessity for a caution signal has apparently arisen in that country, and Mr. H. Raynar Wilson, signal superintendent of the Lancashire & Yorkshire Railway, a member of this club, writes regarding it as follows:

"We have in this country on some of the lines, namely, London, Brighton & South Coast, London, Chatham & Dover, North London, and Lancashire & Yorkshire Railways, what is known as a 'calling on' arm. This arm is one of reduced size fixed below the home signal arm, and the interlocking is so arranged that when the top arm is 'off' the calling on arm is locked at 'danger' and vice versa. The arm shows no light at all when at 'danger,' and when off gives a small green light. Our rules for working such signals are as follows:

"When the calling-on arm is lowered the home signal will be at danger, and vice versa.

"No light will be exhibited at night when the calling-on arm is at danger, but when the arm is lowered a small green light will be visible."

"Drivers must bring their trains to a stand when the home and calling-on arms are at danger, and when the line upon which the train will travel is blocked, but sufficiently clear to admit the train, the signalman will lower the calling-on arm, which will authorize the driver to draw slowly and cautiously forward, but only so far as the line is clear. When the home signal arm is lowered drivers may proceed forward.

"Signalmen must not lower a calling-on arm until the approaching train has been brought to a standstill at it.

"If you were to adopt such a signal, it would appear to me that it would serve admirably as your caution signal, as a driver seeing the top arm at danger, and the small green light, would know that the line ahead was not clear throughout, and would proceed cautiously, while during the day the signal would be very distinct."

Attempts have been made to solve this question by the adoption of a position signal for night as well as day in which the light of a lamp as reflected upon a mirrored surface of the semaphore arm would show the arm itself to be illuminated and by its position, and in some cases by a change of color also, give the necessary information to the engine men. The two best known forms are the "Koye parabolic semaphore" and the arrangement of Spicer & Schreuder which employed a flat surface instead of the parabolic form.

Among the plans which have been proposed but not adopted are those which employ red for "danger," green for "clear" and a third color for "caution," and those which make use of the first two colors just mentioned for the home signals and for the distant signal indication employ more than one lamp and give the indications by arranging two lights vertically or horizontally in accordance with the position of the arm. It has also been suggested that the distant signal be discarded as such and its place be taken by a permanent sign in the form of a slow board against which a lamp would reflect light at night for the purpose of calling the attention of the engineman. This would merely indicate the approach to an interlocking plant. In addition to these methods several patents have recently been taken out for illuminating a semaphore blade by means of a line of incandescent electric lamps receiving a current from "a convenient source." The list of suggested systems is much larger than this, but it is believed that the most prominent and best authenticated have been mentioned.

A suggestion has been made, though it has not been known to have been put into practical use in which the red, green and white indications, giving respectively danger, caution and clear, shall be retained, but in the manufacture of glass used to give the red and green indications a wire netting shall be placed within the glass itself, whereby the danger of breakage is greatly reduced.

If the distant signal was not necessary, there would be

no color problem for night signals, the red and green being admirably adapted to the giving of safety and danger indications, and in studying the question two points are to be considered: First, is what may be termed the common practice of using red for danger, green for caution, and white for clear, dangerous to such a degree as to require a change? Second, if the change is necessary, how shall the caution indication be given? The attempts to use illuminated blades do not seem to have attained results sufficiently satisfactory to warrant turning to them for relief, although they constitute what is theoretically an ideal signal. Before drawing a conclusion, it seems advisable to look over the systems in use and proposed, with a view of comparing them upon the basis of the real object to be sought, which comprises distinctiveness in indication, the principle of giving a danger indication in case of failure (which in this case would be a broken glass), clearness of indication at a distance in thick weather, consistency, practicability and reasonable cost.

In looking over the systems mentioned in the foregoing, the objection raised to the first mentioned system, which is in most general use, is that the breaking of a red or green glass may give a clear indication. The criticism of the system employing several lamps and giving caution and clear indications by means of lights arranged vertically and horizontally, is that the number of lights is confusing, and also, the cost is high both of installation and maintenance. The principal objection to the Chicago & Northwestern, or Mr. Carter's system, is that a general adoption of the plan would involve considerable expense. This arrangement is considered practical, efficient and safe, and it does not require more than one lamp per signal. It is no more inconsistent to show a red light in connection with a green light upon a single post for a caution indication, than to show a green and a red light vertically over each other upon one post at a route signal, one arm of which is clear. This signal is distinctive, the absence of a red or green glass would not indicate clear; it can be seen at a sufficient distance, and while it might be advisable for a road commencing to equip with signaling to adopt this as a standard, the cost of the double spectacles and the special lamp, while not great for an individual signal, would constitute an objection which, in the opinion of the committee, the advantages to be gained by the system are not likely to overcome to a sufficient degree to secure its adoption of place of existing systems.

By using white for a cautionary indication a broken red glass might give a cautionary indication when a danger indication was intended. This is open therefore to the same objection as the first mentioned plan. The objection to the "calling-on signal" is that it would conflict with the present system of using route signals and also an extinguished lamp on a red signal would lead to great danger.

In the deliberations of the American Railway Association and the American Society of Railroad Superintendents, a great deal of attention has been paid to this subject of colored lights for signals. The former organization does not feel justified in recommending a change from the system employing white for a night signal, and it has endorsed, though not recommended, Mr. Carter's system. The superintendents' society is on record unanimously to the effect that there is not sufficient reason for discontinuing the use of white for a clear indication in American signal practice. It must be admitted that it is desirable to discard the white and to use green for "clear," but in view of the fact that to a very large extent, practical questions must govern, the committee deems it advisable at this time to make the following recommendation.

Inasmuch as no satisfactory third color has been found by which to indicate caution, and as it would be unwise under the circumstances to recommend any change from the present widely used system which would involve much expense and radical change of standards, and also as the present state of the art with regard to illuminated blades, does not warrant dependence upon the position signal, the committee believes that the best arrangement for the club to recommend at this time is that the present most generally used system be retained, namely: red for "danger,"

that no other recommendation can be effective. It will require stronger arguments than any which have yet been brought up to bring about a radical change of system, and the best system for this club to endorse seems to the committee to be one which carries with it a possibility of general application.

TRANSMITTING TYPE WRITTEN TELEGRAMS.—A press dispatch is authority for the statement that Prof. Henry A. Rowland of Johns Hopkins University, after lengthy experiments and investigations, has obtained successful results from an invention for transmitting telegrams written upon the typewriter at the place of sending and reproduced in typewritten form at the receiving point. In addition to the typewriting part of the invention, Professor Rowland with his new machine can, it is said, send five or six different messages over the same wire at the same time in one direction. Thus with five operators at each end of the line, sending each an average of 30 words a minute, 300 words can be transmitted each minute. He uses a synchronous device in his invention, wherein it differs from any former inventions of like character. In the mechanical arrangement of the typewriter he uses but eight signals, the letters being produced by combinations. Professor Rowland calls his invention the multiplex printing telegraph.

The Western Society of Engineers.

The publication committee of the Western Society of Engineers has sent out the following questions for the purpose of assisting in the topical discussion on the subject of steel forgings, which is to be published in the second number of the proceedings of the society. The questions are offered merely as suggestions and replies are desired by the committee before March 30:

1. Are there any advantages of steel over wrought iron forgings? If so, what are they?
2. Are forgings made from open hearth steel superior to those made from Bessemer steel? If so, why?
3. Is there any difference for practical uses between forgings made from basic and acid steel?
4. What methods have been found to give most satisfactory results in producing solid and homogeneous ingots from which forgings are to be made?
5. Should steel forgings be made under separate and distinct methods of treatment from wrought iron forgings?
6. What are the relative merits of hammered forgings and those forged under a press?
7. Should there be any treatment of forgings subsequent to forgings and before machining? If so, what?
8. What is the effect of simple annealing of forgings and also of tempering and subsequent annealings?
9. What is the best form of specification for machine and engine forgings where the surface is finished and subjected to wear?
10. What is the best form of specification for drop hammer rods, stamp stems and other similar forgings which are subjected to shock and vibrations?

THE ROCK ISLAND BRIDGE.

In a recent issue of this journal the fact was noted that an accident had occurred during the reconstruction of the government bridge over the Mississippi river between Rock Island and Davenport on February 25. This accident was due to the movement of ice in the river, and an interesting photograph has been received, showing the appearance of the draw span after its failure. The casualty was not a serious one, as only two panels of the draw span were in place at the time of the failure. In the fact that about 175 tons of material went down and that nearly all of this was duplicated and shipped from the works of the contractors, the Phoenix Bridge Company, within fifteen days after the accident, lies its most



AN INTERESTING FAILURE OF FALSEWORK.

green for "caution" and white for "clear," and that precautions be taken by thickening the colored glasses, or by embodying within them a netting of wire whereby the danger of breakage would be very nearly if not entirely overcome. Wire nettings have been successfully placed against the ordinary glass in the present form of spectacle castings and with good effect. There seems to be no system which so nearly as this meets the requirements as stated and against which fewer important objections can be raised. It is not considered an objection that some other white light might be mistaken for a clear signal, in view of the fact that experience has shown that trouble is not to be anticipated on this account. The committee has experimented, as has been already stated, and after going over the ground carefully, the conclusion has been reached

interesting feature. This is also highly creditable to the contractors. A large amount of the material which went down was not damaged beyond being twisted, and it can therefore be used again. It is an interesting fact also that though the Chicago, Rock Island & Pacific Railroad was deprived of the use of the bridge for five days, the traffic of the road was not interfered with in the least, as the business was all transferred by way of the Burlington, the Chicago & Northwestern, and the Burlington, Cedar Rapids & Northern railroads, without any material delay of the trains and with no interruption of traffic.

*Report of a committee to the Railway Signaling Club at the meeting held in Chicago, March 10, 1896.

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WHAT is the probable outcome of present dullness in so many branches of trade is a very natural inquiry and one which can be more easily made than answered. Every one can recall how often prosperity was promised if only such a measure were taken. Such a law passed all these things have been done. Business men, railroad builders, promoters, all hesitate and wonder. Within a week there has been a general decadence of prices, accompanied, as usual, by a hesitancy among buyers, who naturally desire to buy in the most favorable market. It is rather curious and interesting to note the very large amount of projected work awaiting better financial and general trade conditions. It may not be strictly true, but the probabilities are strongly that way, that at no time in our history has there been as much projected work. Casting aside the period of transcontinental railroad building, there never was a time when there was as much projected railroad building as now, and possibly never a time when there was any reasonable probability of as little being built. Enterprise is waiting for the password, and the man who can give it will be president.

THE last few years has developed among a certain class of lawyers, a branch of business that might be appropriately called the "railroad industry," in which damage claims for every conceivable cause are the chief factor. The extent to which this industry is carried on may be estimated from the fact that a single western road in nine years had brought against it damage claims amounting to \$1,729,655. The legitimacy of these claims is fairly measured by the fact that considerably more than one-half of these claims were settled out of court on payment of \$39,039. Of those cases which went to trial, judgments for \$44,932 were obtained on claims amounting to \$665,059, which judgments were subsequently settled for \$30,559. It thus appears that the amount of claims for damages are nine times greater than the sum required to pay the damage, notwithstanding it is notorious that juries invariably favor the plaintiff in such cases. The character of some of these claims is well illustrated by one case recently brought in Lorain county against the Cleveland, Lorain county against the Cleveland, Lorain & Wheeling Railroad for \$10,000. The plaintiff was at one time employed in the shops of the company at Lorain and he claims to have injured his health by working in a draft. This case, together with the facts above given, are cited to show to what lengths some attorneys will go to obtain business, the figures given being sufficient to indicate not only the validity but the character of the claims presented.

IN OUR issue of January 11, of the current volume, some comment was made upon the proposed legislation looking to the enlargement of the force of the engineering department of the United States navy and tending to show the need of increased efficiency in this department by adding to its complement of officers. A communication to the New York Tribune from Prof. W. F. Durand, of Cornell University, is of interest in this connection. Prof. Durand was formerly connected with the engineering department of the navy and appreciates the present situation. He says that in 1882 at the time when the new navy was started, thirty-five war ships were in commission, on which the total indicated horse-power aggregated about twenty-five thousand. There are now about thirty ships in commission with a total of nearly two hundred thousand indicated horse-power.

He brings out the remarkably crippled condition of the force of engineer officers in whose hands this machinery is placed, by showing that owing to the laws and other causes the number of men has been reduced from two hundred and seventy-five to one hundred and seventy-three, or about one hundred less than the number on duty in 1882. In view of the enormous value of the present warships, which has been placed at about fifty millions of dollars, it ought not to be necessary to make any argument for at once providing means for properly maintaining and operating the machinery of these vessels. The proposed legislation places the number of engineer officers at three hundred and three, which is only about thirty more than the number of men having charge of the engines of twenty-five thousand total horse-power on the rolls in 1882. This proposed increase therefore seems entirely within reason, and in fact it may be properly questioned whether a sufficient number of men are to be provided by the new legislation. However, it may be well to assume that the proposed number is sufficient at this time, especially in view of the fact that the legislation will probably also provide means for recruiting this service with properly equipped men from the technical schools.

FROM the beginning of signaling England has been considered head and shoulders above all other countries in this branch of engineering, and American methods and devices have to a large extent been brought out as a result of experience over there. It is worthy of note that *Engineering* of London in commenting upon the report of the British Board of Trade upon the Georgie Junction wreck near Edinburgh on the North British Railway November last, recommends American devices for protection against similar casualties. The wreck occurred on account of a signal which was out of adjustment and gave a "clear" indication when "danger" should have been displayed. The signal was seven hundred twenty-six feet from the tower, and in regard to this the journal referred to makes the following recommendation. "We would further point out that with the electro-pneumatic system of signaling which we recently described in our columns this accident could not possibly have occurred, as in the first place there are no movable wires or other connections to be effected by the weather and thus cause the signal to droop; and secondly had the signal drooped from any other cause all conflicting signals would not have been pulled off, as unless a signal arm actually returns to "danger" or to so near the "danger" position that it could not be mistaken, when the lever in the locking frame is thrown back, this lever is prevented from going fully home, and thus through the ordinary mechanical interlocking the levers of all conflicting signals are locked in their normal or "on" position. With the electro-pneumatic system there would also be no need for the cabin to be moved nearer the junction, as signals and points work equally well and with the same degree of safety at any distance from the signal box." This estimate of the electro-pneumatic system is correct, and the checks provided by it against failure of apparatus are not found in mechanically connected plants. But the most noteworthy feature of the article is the degree of fairmindedness with which the acknowledgement is made. An extension of this feeling may result in doing away with some of the exceedingly complicated mechanical interlocking machines now in use in England.

A CONCISE and correct statement of the difficulties surrounding the question of the best system of colored lights for railway signaling at night will be found in the report of the committee of the Railway Signaling Club, presented at its March meeting. This report is reproduced in full, as it brings the matter up to date in a way which is worthy of attention and commendation. There are great differences of opinion upon this subject, which is perhaps the most troublesome question in signaling, and it is one which all interested would be heartily glad to see definitely settled. The systems proposed are many, and almost all owe their existence to the distrust of white as a clear indication. In all the discussion of lights no one has claimed that white is better than green as an all clear indication, and the best practice would seem to demand that some color other than white should be used for a clear signal. The committee referred to, however, is undoubtedly correct in the statement that it will require stronger arguments than any yet brought forth to bring about a radical change of system in regard to the colors now in such general use. It does not seem at all probable that any organization of railway men will make a recommendation which would involve the expense incident to a

change to green for "all clear." It cost the North British Railway of Scotland eighty-five thousand dollars to make the change from white to green, and it would cost the Pennsylvania Railroad about the same amount. It would not be safe to say that the change will never be made in this country, but it is, to say the least, not likely to be done. The committee might properly have come out more strongly in favor of green and for the Carter system as the safest system to employ, with emphasis on the safety, and then they might have said that if this can not be adopted on account of the cost, the next best thing is to improve that system which is in general use and make it as safe as possible. The inference to be drawn from the report is that the objections to white lights are largely theoretical, and it must be admitted that a great many well informed operating officers take this view. It is true also that no change will be made until these officers have made up their minds that they want green instead of white. One serious wreck might have an influence in this matter, but after all, the danger seems not greater than many others which exist in present methods of interlocking. Every one would be glad to have green replace white, but if this can not be accomplished, as the committee believes, then by all means the system now in use ought to be strengthened. This ought to be done anyway, pending a decision. Those who have made up their minds to accept nothing but green, will see little to commend in the report beyond its clearness of statement, but the committee may be and probably is right in recommending that which is possible, rather than something which is most desirable but impossible of attainment.

THE GOVERNMENT TIMBER TESTS.

Attention of engineers and others interested in the use of timber in structures of all descriptions is specially called to the communication from Mr. B. E. Fernow, chief of the forestry division of the United States department of agriculture, to Mr. Walter G. Berg, in which is stated the condition of the timber test work which has been so successfully carried out by that division. The fact is clearly brought out that unless congress takes some decidedly favorable action it will be impossible to complete this work or to publish the records of a large number of tests which have already been made. The completeness of the tests which have been finished and of which the records are in published form, is such as to place them above all others in value and it is certainly unfortunate that there should be any delay in the publication of the rest of the data. It is not to be admitted that the information will be long withheld but something must be done in order to allow the records to give the measure of assistance in engineering work for which they were inaugurated.

The tests are the most exhaustive which have been made in this line and yet only about twenty-one hundred out of nearly forty thousand have been published. The remainder are all in good order in manuscript form ready for publication and these are not of less value than the records of the work on southern pine which was embodied in the eighth bulletin of this division. It should be noted that Mr. Fernow does not consider tests to the number of two hundred seventy six as giving sufficient data for satisfactory comparison of timbers, and therefore his work on Oregon fir does not warrant the drawing of conclusions. He believes, however, the work which has been done upon southern pine to be so complete as to render it unnecessary for any other experimenters to test these woods again, and the tests cover such a great variety of conditions that absolute confidence may be placed in the reliability of the data. Such tests in any branch are rare and it is fitting that acknowledgement should be given to the experimenters in every possible way.

The great and growing importance of giving more attention to the use of timber both for bridge and track work has been perhaps sufficiently emphasized in these columns, but it seems appropriate to present the following quotation from the introduction to the twelfth bulletin of the forestry division, which has just been received:

"There are in the United States at least two thousand miles of timber trestle, representing an expenditure of more than sixty million dollars. These have to be entirely replaced every nine years, on the average, making an annual expenditure of about seven million dollars, which capitalized at four per cent, gives an invested capital of one hundred and seventy-five million dollars, necessary to maintain these structures, consuming annually about two hundred and sixty million feet B. M. of timber, nearly all of it being in large sizes very valuable for other purposes."

There may be differences of opinion as to whether

ven such valuable test work as this should be carried out by the government, but without discussing this side of the question here, it is not believed that any one will be disposed to oppose the completion of the tests so well begun, and the publication of the records.

"THE CHANGING MAP OF TRADE."

There has been no little interest manifested of late in connection with what has been euphoniously termed "the changing map of trade." This interest has grown out of the statements made regarding the increased movement of grain products to southern ports, and all sorts of predictions concerning the immediate establishment of large commercial centers in that section have been made, and that the business of the present commercial routes in danger of being seriously affected, if not practically destroyed. While it is no doubt true that the movement of produce to and through these ports has largely increased during the past few years and perhaps will be considerably augmented during the next few years, there is no immediate danger that the long established channels of trade will be encumbered with weeds because of such movement. Indeed it may be doubted if these new transportation routes will handle in the aggregate very much, if any, more than the natural increase of trade in the territory from which the traffic is drawn.

It requires no argument to demonstrate the fact that the gulf ports are much nearer the western and southwestern producing areas than are the north Atlantic ports; but mileage, even when added to deep water facilities, is not altogether controlling in the movement of commerce. The establishment of regular lines of steamships, as is the case of Newport News, will aid it in promoting regular trade and thereby increasing the likelihood of shipping facilities, but any extended movement of grain products cannot be hoped for until the shipping facilities afforded at these several ports are likely to be adequate to the demands made upon them. Before the gulf ports can hope for any large trade in this direction reciprocal relations must be established with other countries, and thereby a sufficient volume of return commerce be provided to warrant the necessary tonnage space for outbound traffic.

A good illustration of the need of reciprocal trade is afforded at Galveston, Tex. That city is by no means a new projection, but has had for years some trade with foreign ports. During certain seasons of the year offerings of cotton are known to be readily obtainable at that port, and yet it sometimes happens that no bottoms are at hand, so that it is by no means an infrequent occurrence for cotton to be transported by rail from Galveston to New York and Boston, and thence to Liverpool. Not only so, but strange as it may seem, cotton has been taken in considerable quantities by this route in direct competition to vessels waiting cargo at Galveston.

Another obstacle in the way of a large produce movement via the gulf ports is the prevailing climatic conditions. Commerce will not submit to any certain or even probable interruption of its channels and the continued maintenance of the gulf routes are by no means assured. The competent handling of grain requires the establishment of storage facilities and a climate as damp as is that of the gulf coast during certain seasons of the year, is not the best suited for holding cereals and putting them into the best possible export condition. Some of these products may be able to withstand the deleterious effects of such a climate, but others, as oats and corn, will, under certain conditions, and at some seasons of the year inevitably become "hot" thereby rendering their transportation movement uncertain.

It is not intended to decry the growing importance of these new channels of trade. The RAILWAY REVIEW was among the first to point out the influence which these southern ports would sooner or later exercise upon the commerce of the country and the writer hereof was engaged for some years in endeavoring to establish just such a movement as is now the subject of so much attention. There is, however, no reason why any alarm should be felt or expressed concerning its effect upon the long established routes. That changes will come is not denied, but they will come so slowly as to allow of easy adjustment to meet the new conditions. Sensational headlines and diagrammatic maps may furnish topics for temporary discussion but the business of the country will proceed as usual. If by such agitation congressional appropriation in aid of deep water facilities shall be more readily obtainable, the main object of the advocates will have been served, and at the same time the advantages of the several new

ports will have become advertised so that as the opportunity offers they may be made available to serve the country naturally tributary to them.

WATER PURIFICATION FOR LOCOMOTIVE USE.

One of the most troublesome questions in railway operation and one which directly concerns the expense thereof to a very important degree is the quality of the water used for the locomotives. The amount of money spent in repairs for locomotive boilers, owing to the rapid coating of the surfaces with scale, constitutes a large item, and yet this is not all of the expense, for in some cases it is necessary that boilers should be washed out after every trip in order to keep them in even approximately clean condition for service. The ideal way of supplying water in districts where good water is not available is to pipe from the nearest point where a good quality may be obtained. There are very few roads, however, that are in a position to take advantage of such a plant. Attention is called to this question at this time by an illustrated description, in a contemporary journal, of the new central water supply station which has recently been put into service upon the Long Island Railroad. This plant is very complete and consists of a line of twelve inch pipe eight and one-half miles long in addition to which there is one mile of ten inch pipe. The equipment also includes storage tanks and water columns. The supply is obtained from fourteen wells which were built by first sinking a light iron casing twenty-four inches in diameter. With in each casing was placed a vitrified pipe and the outer casing was then removed and a four inch suction pipe with a foot valve at its lower end, was carried nearly to the bottom of the well. The power is supplied by two Worthington triple expansion pumping engines and the whole equipment resembles a municipal water works. In this case the high cost, which was about sixty thousand dollars for the main line only, will doubtless be amply returned in saving the repairs upon the locomotives, and the expense is therefore perfectly justifiable. It will be highly interesting to know the comparative results obtained with this and the system which was formerly in use and in which the water supplied was much inferior to that now furnished.

As already intimated, the plan pursued by the Long Island Railroad, while an ideal one is on account of various reasons entirely beyond the reach of nearly all of large railways, and it may be said that a great majority of mechanical officers have come to the conclusion that the only satisfactory method of securing good and economical results in districts of large extent where the water is bad is to subject it to treatment locally with chemicals for the removal of the objectionable features before the water is pumped into the boilers. The pipe line plan is obviously not available on Western lines and many of the methods of treating water after pumping it into boilers have proved to be failures. The treatment of water in the tenders of the locomotives has advocates, and in some cases it has been successful, but it is thought that a systematic plan of treating the water in stationary tanks before it is run into the tenders might be made yet more efficient and easily operated. This is no new idea, but one which has been in successful use upon foreign roads for a number of years, and it seems surprising that so few practical experiments along this line have been carried out in this country. The cost of additional tanks for settling purposes is not large, and so far as is known it has not been claimed that there is a doubt of the ultimate gain to be made. The cost of a tank of about one hundred thousand gallons capacity with the necessary labor to erect would be less than two thousand dollars. Two such tanks could be set up for four thousand dollars, and as no additional pumps would be required, this sum may be said to measure the expense of a thorough trial of the tank treatment. This size of tank would be larger than is required except at points where many engines are handled. It would not in all cases be necessary to put in so large a tank as this, and if the plan were tried first upon a branch line the expense might be reduced greatly, and perhaps by using old tanks, it could be accomplished with only the cost of labor.

It has been well said that when as a result of bad water the life of fire-boxes is cut down from seven or eight to about two years, tubes have to receive constant attention, and frequent washing of boilers is required, economy would dictate a greater expenditure of money to obtain pure feed water than is commonly believed. In our issue of April 6 of last year an outline was given of the troubles which have been experienced with bad water upon the Union Pacific Railway where it has been necessary to wash

out boilers at the end of every run of one hundred thirty-seven miles, and also where in some cases the engines had to be run with cylinder cocks open on account of the foaming of the water. These troubles have been experienced in that section for twenty-five years and the flues of the boilers would not last over a year. At the end of this time they were so badly pitted as to be unfit for further service. Some of the difficulty has recently been removed by blowing out with pneumatic blow-off cocks and by the application of feed water heaters, but there would seem, in cases similar to this, to be an excellent opportunity to determine the value of the water tank treatment. If the road like the one on Long Island is justified in expending sixty thousand dollars in improving its system of water supply an experiment of the tank purification system at a comparatively small cost seems, to say the least, worthy of consideration and this question is one upon which it would be well to study.

STANDARD RULES FOR LOADING LUMBER.

Among the important matters to be brought up at the coming convention of the Master Car Builders' Association is a revision of the present recommended practice with regard to the loading of lumber and poles. A number of mechanical railway officers have been agitating the subject, prominent among whom is Mr. Leeds, of the Louisville & Nashville Railroad, whose suggestions for improvement are outlined elsewhere in this issue. The action taken so far by the association is merely to place a series of illustrations of methods of loading lumber and poles in the set of drawings showing the "recommended practice" of the organization. There is no standard and the report of the committee which resulted in the adoption of the "recommended practice" is not sufficiently explicit to give it value in the loading of cars to such an extent as to insure the acceptance of the methods shown by the various roads which may be called upon to handle the cars so loaded. In other words a car loaded with lumber in the south may be arranged in accordance with these recommendations and with the rules of the road upon which the car is loaded, but there is no assurance that the car will not be stopped by other roads upon which different rules are in force. There is, therefore, great need of a code of rules which will enable any road to load cars with the positive assurance that they will meet the requirements of other roads and be considered safe to go anywhere upon roads represented in the association.

There are rules now in force upon near all the important roads and they should be carefully considered and a standard adopted which will be so clear and comprehensive as to do away with all necessity of transferring the loads which is now frequently done. For instance, on account of some roads which require that the brake wheels shall not be interfered with or some similar specification which might easily be provided for in the loading if the rule was known to exist upon any of the roads over which cars were to be shipped. The rules offered by Mr. Leeds have the merit of being explicit, definite and as concise as it would seem advisable to make them without danger of ambiguity. They cover all cases which seem likely to arise in ordinary shipments, but they do not cover rules for racking dressed lumber which it would seem ought to be added inasmuch as this precaution is required upon some roads. A discussion of the question, however, might result in the waiving of this requirement and the establishment of rules in which this one would be omitted. No mention is made of dressed material in the report of the committee to the association in 1890, which formed the basis of the "recommended practice," and while it might be inferred that Mr. Leeds does not consider this an important matter it would seem necessary to provide racking or to state that racks shall not be required.

Mr. Leeds should have credit for the systematic method of working out the rules and the consideration of the location of the stresses in specifying the limiting loads for each length of timber. The distances between the supports being given it follows that not over a certain maximum weight should be allowed upon each, the amount depending upon the capacity of the car and the overhang of the load. The effect of the overhang might easily be neglected if the attention of shippers was not directly called to it. The arrangement of loading material which is thirty-four feet eight inches long upon a car only thirty-four feet long which is suggested by Mr. Leeds is open to criticism unless the total load of the car is so reduced as to render the lack of balance of the load negligible. The rules call for an alley two feet wide through the load opposite the

brake wheel. In some cases this space might be partially filled by short stuff, but if this material is not available the load should be made light, say about three-fourths of the capacity of the car. Mr. Leeds appreciates this point, and has made this suggestion himself. It would seem as necessary as regards safety to require lumber of this length to be loaded upon two cars, as in the case of that which is thirty-six feet long. This matter has been brought before the association and has been referred to the committee on supervision of the standards and recommended practice of which Mr. R. H. Soule is chairman. It is to be hoped that at the next convention it may receive the attention which it deserves.

STANDARD METHODS OF LOADING LUMBER.

With a view of obviating the difficulties arising from the absence of a satisfactory standard method of loading lumber and poles upon cars, Mr. Pulaski Leeds, superintendent of motive power of the Louisville & Nashville Railroad, has compiled a complete set of rules governing the loading of this material. This plan has received favorable consideration by a number of southern roads, and Mr. Leeds hopes to have the question taken up at the next convention of the M. C. B. Association, looking to a revision of the present "recommended practice" and the substitution of a more comprehensive and satisfactory standard.

Mr. Leeds' suggestions have been received in printed form covering six folio pages, and it is to be regretted that for lack of space the whole paper cannot be presented here. The following, however, gives the most important features. The methods recommended are based upon cars 34 ft. long, and the rules are arranged in six divisions, according to the length of lumber to be loaded. The first division treats of material not over 33 ft. long. After this several different lengths are treated of which the following is an example:

Material not Over 42 feet Long

This material must be carried on one car, the second car being simply an idler. The latter must invariably be a flat car, while the car carrying the load may be either a flat car or a drop-end gondola. The four stakes on each side of the carrying car should be placed as near the bolsters as possible, and no stakes whatever should be used on the idler. All stakes should be fastened at the middle with wire, and either with wire or boards at the top. The material on carrying car must rest on bearing pieces not less than 6 x 8 in. in section, and in length equal to the full width of the car, to prevent the lading from touching the idler, so that the cars can curve freely. These bearing pieces should be placed directly above the bolster, or as near to it as possible, but never between it and the end of the car. Should the idler be higher than the loaded car, the bearing pieces must be of sufficient thickness to keep the ends of the lumber at least 4 in. above the floor of the idler. The lading overhanging the idler must not project more than 15 ft. from the center of the bearing piece, so that the ends will not project too far beyond the side of the car in curving. Short material may be loaded on the idler to the extent of one-half its marked capacity. There must be, however, a space of at least 2 ft. between the lading of the two cars. As the load on one truck of the carrying car is in excess of that on the other, and in direct proportion to load on bearing pieces and the overhang, care should be taken in all cases to load as near to the brake staff as possible, but leaving the brake accessible and operative. This should bring about 28 ft. on the car from the center of inside truck. When loaded in this manner the following are the maximum weights which may be carried on a 34 ft. car:

On a car of 60,000 lbs. cap.—Lumber 36 ft. long, 55,000 lbs.		
"	38 "	51,000 "
"	40 "	48,000 "
"	42 "	45,000 "
On a car of 50,000 lbs. cap.—Lumber 36 ft. long, 45,000 lbs.		
"	38 "	42,000 "
"	40 "	39,000 "
"	42 "	37,000 "
On a car of 40,000 lbs. cap.—Lumber 36 ft. long, 36,000 lbs.		
"	38 "	34,000 "
"	40 "	32,000 "
"	42 "	30,000 "

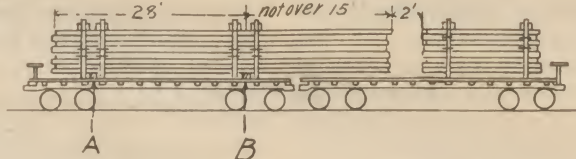
Cars less than 34 ft. in length, or that will not allow 28 ft. fully on the bearings, should not be used in this method of loading for any length exceeding 35 ft., as the overhang is too great for safety.

The upper view of the accompanying illustration shows the arrangement recommended and the strain sheet from which it was derived.

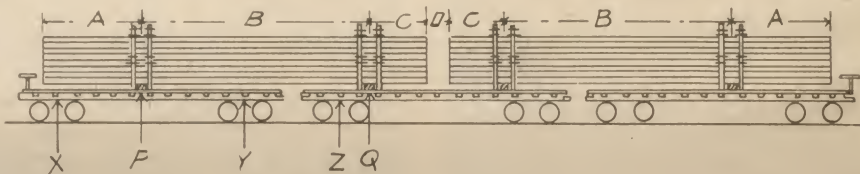
Three arrangements of loading material between 40 and 70 ft. long are shown, one of which is illustrated in the second figure of the illustration, below which are three strain sheets made out for cars of different capacities. When loaded as shown the following distances govern as indicated by the lettering in the illustration:

WHEN LOADED ON CARS 34 FEET LONG.

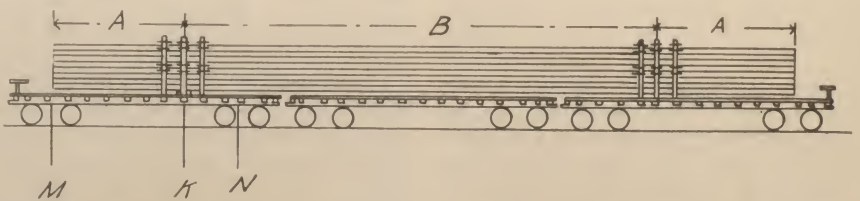
Length of Lumber	A	B	C	D	Marked Capacity of Cars	Maximum Aggregate Weight to be Carried
40 ft. 10 ft. 3 in.	24 ft.	5 ft. 9 in.	10 ft.			
45 ft. 11 ft. 9 in.	27 ft.	6 ft. 3 in.	6 ft. 6 in.			
50 ft. 13 ft.	30 ft.	7 ft.	6 ft. 6 in.			
60 ft. 17 ft.	33 ft.	10 ft.	2 ft.			
WHEN LOADED ON CARS 30 TO 32 FT. LONG.						
40 ft. 10 ft. 3 in.	24 ft.	5 ft. 9 in.	8 ft.			
45 ft. 11 ft. 9 in.	27 ft.	6 ft. 3 in.	4 ft.			



On a Car of 60000*Capacity	Length of Lumber	Maxim Wt.	Wt. at A	Wt. at B
	36 ft.	55000 lbs.	22448	32552
	38 "	51000 "	18735	32265
	40 "	48000 "	15673	32327
	42 "	45000 "	12857	32143
On a Car of 50000*Capacity	Length of Lumber	Maxim Wt.	Wt. at A	Wt. at B
	36 "	45000 "	18367	26633
	38 "	42000 "	15428	26572
	40 "	39000 "	12735	26265
	42 "	37000 "	10571	26429
On a Car of 40000*Capacity	Length of Lumber	Maxim Wt.	Wt. at A	Wt. at B
	36 "	36000 "	14694	21306
	38 "	34000 "	12500	21300
	40 "	32000 "	10449	21331
	42 "	30000 "	8572	21428



60000 lbs. Cars 34 ft. long									
Max. aggregate weight allowed	length of lumber	Weight at P	Weight at Q	Weight at X	Weight at Y	Weight at Z	Distance Q to Z	Distance P to X	Distance P to Y
*135000	40 ft.	40078	27422	16903	23175	27422	1.6	14.2	10.4
"	45 "	40625	26875	20037	20588	26875	2.9	12.5	12.10
"	50 "	40500	27000	22868	17632	27000	4.0	10.8	13.10
*115000	60 & 40 "	41818	27182	19344	22474	16642	9.6	13.2	11.4
weight of 60 ft. lumber = 3/5 of total load or 69000 lbs.									
50000 lbs. Cars 34 ft. long									
Total Weight	Length	P	Q	X	Y	Z	Q to Z	P to X	P to Y
112000 lbs.	40 ft.	33250	22750	14023	19227	22750	1.6	14.2	10.4
"	45 "	33703	22297	16622	17081	22297	2.9	12.5	12.10
"	50 "	33600	22400	18976	14624	22400	4.0	10.8	13.10
92000 "	60 & 40 "	33454	21746	15475	17979	13314	9.6	13.2	11.4
weight of 60 ft. lumber = 3/5 of total load or 55,200 lbs.									
40000 lbs. Cars 34 ft. long									
Total Weight	Length	P	Q	X	Y	Z	Q to Z	P to X	P to Y
90000 lbs.	40 ft.	26718	18282	12178	14540	18282	1.6	14.2	10.4
"	45 "	27083	17917	13357	13726	17917	2.9	12.5	12.10
"	50 "	27000	18000	16062	10938	18000	4.0	10.8	13.10
70000 "	60 & 40 "	25454	16546	11774	13680	10131	9.6	13.2	11.4
weight of 60 ft. lumber = 3/5 of total load or 42000 lbs.									



Length of Lumber	Weight at K = 1/2 max. wt.	Weight at M	Weight at N	Distance M to K	Distance K to N
70 ft.	30000 lbs.	714	29286	23' 11"	7'
80 "	32000 "	1938	28062	22' 11"	1' 7"
90 "	40000 "	7482	32518	19' 11"	4' 7"
100 "	40000 "	12380	27620	16' 11"	7' 7"
70 "	25000 "	595	24405	23' 11"	7'
80 "	25000 "	1615	23385	22' 11"	1' 7"
90 "	33000 "	6173	26827	19' 11"	4' 7"
100 "	33000 "	10214	22786	16' 11"	7' 7"
70 "	20000 "	476	19524	23' 11"	7'
80 "	20000 "	1972	18028	22' 11"	1' 7"
90 "	27000 "	5051	21949	19' 11"	4' 7"
100 "	27000 "	8357	18643	16' 11"	7' 7"

METHOD OF LOADING LUMBER.

Material from 70 to 100 ft. long is to be loaded in accordance with the lower diagram. The bearing pieces are required to be at least 10x10 in. in section. Three cars are required and the number of stakes, the size and their attachment by wire across the load are specified. The maximum load for lumber of less than 90 ft. long must not exceed one half the marked capacity of the two end cars, but for lumber of 90 ft. and over two-thirds of the marked capacity of these two cars will be allowed. The following values of the distances A and B are specified:

Length of lumber, 70 ft.	- A, 10 ft.	B, 50 ft.	A, 10 ft.
" 80 ft.	- A, 14 ft.	B, 52 ft.	A, 14 ft.
" 90 ft.	- A, 16 ft.	B, 58 ft.	A, 16 ft.
" 100 ft.	- A, 18 ft.	B, 64 ft.	A, 18 ft.

There are also a number of general specifications and directions for chaining the bolsters of cars loaded with lumber upon roads which require this precaution. A provision is made for loading lumber upon gondolas and the location and size of the bearing blocks as well as the staking is stated. The rules close with a set of tables arranged to correspond with the different arrangements illustrated in which the relative heights of loads of different weights and lengths of a number of kinds of lumber are given. Some comments upon these rules will be found in the editorial columns of this issue.

A Good Locomotive Record on the New York Central.

The use of extended piston rods for locomotives is increasing and for the reason that excellent results are being obtained with them in saving the cylinders and pistons from excessive wear. In answer to an inquiry Mr. Wm. Buchanan, superintendent of motive power of the N. Y. C. & H. R. R. R., writes as follows concerning the remarkable mileage record of engine No. 870:

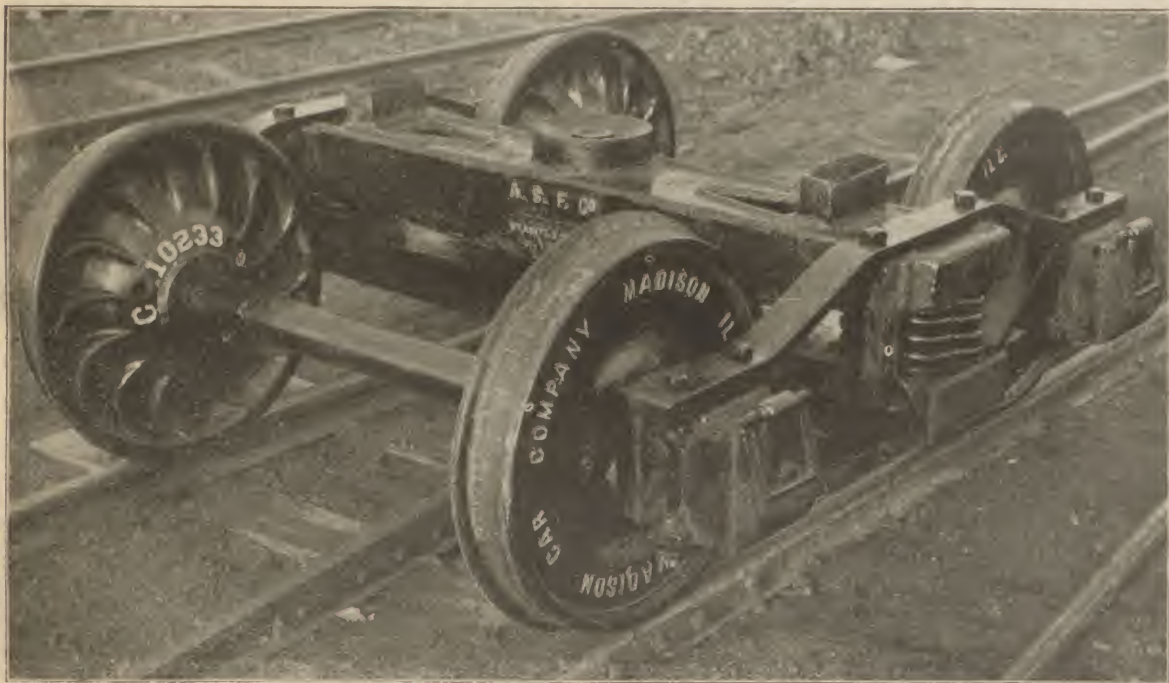
The mileage of this engine while out of the shop was 164,000 miles, an average of 295 miles per day. The engine was run by two crews and left the shop May 12, 1894, to return again December 21, 1895. The cylinders were found to be straight and true from end to end and the wear was extremely small. The piston rings which were applied May 12, 1894, were removed August 12, 1895, after fifteen months of service. They were taken out because of having diminished slightly in size and a new set was substituted. The explanation of the good record of the cylinders is that the use of the extended piston rod reduces the wear on the cylinder and upon the piston rod. In the engine three cast iron spring rings are used in the piston.

The tires on the engine were worn very little, and the record of the engine in this respect is presented elsewhere in this issue in a statement by Mr. P. H. Dudley, from whom diagrams have been received showing the relative wear of tires on two engines upon the broad top 100 lb.

rail and the narrower top 80 lb. rail. The article referred to gives the general dimensions and weight of the engine.

A HEAVY FREIGHT CAR TRUCK.

The accompanying illustration is reproduced from a photograph recently taken from one of a lot of trucks turned out by the Madison Car Company of St. Louis, Mo., and gives an excellent idea of what a neat, simple and strong truck may be made by the use of the American Steel Foundry Company's all

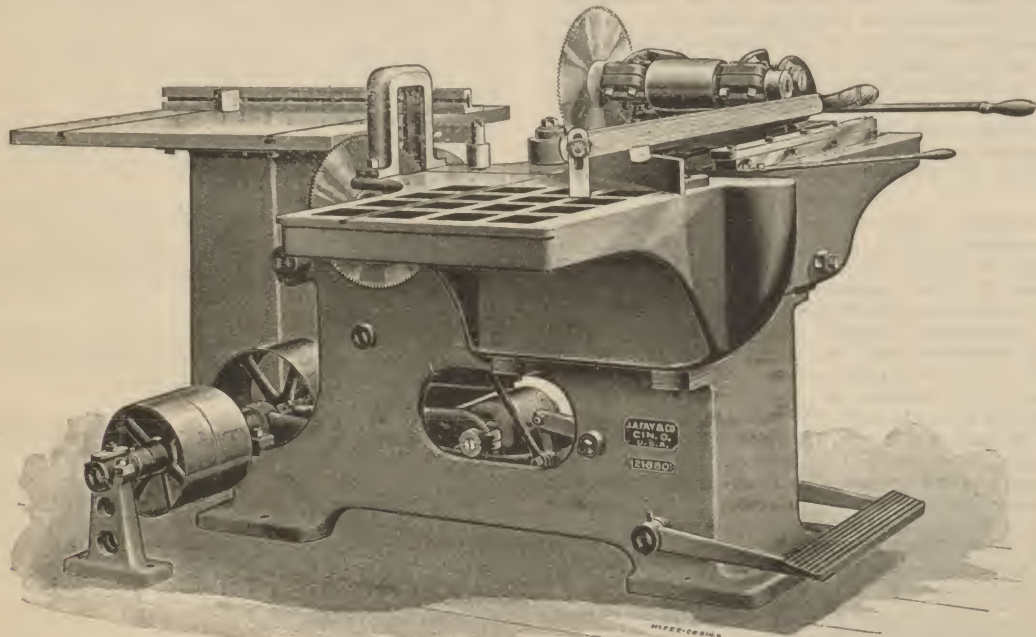


A CAST STEEL TRUCK BOLSTER—AMERICAN STEEL FOUNDRY COMPANY.

steel bolster. There is probably no other truck in use which has so few pieces and at the same time such great strength as this one, and this, together with its good appearance and the wonderfully satisfactory results it gives in service, are said to be keeping the office of the foundry company at St. Louis well supplied with orders, and the works at Granite City, Ill., crowded with work.

IMPROVED CAR BRACE CUTTING-OFF SAW.

The accompanying illustration shows the general appearance of a saw designed by the J. A. Fay & Egan Company for cutting car braces. The main feature of the design is a combination of two saws the fences for which may be set at different angles. An independent table and fence are provided for square cuts so a brace may be given three different treatments at one handling and without making any



CAR BRACE CUT-OFF SAW—J. A. FAY COMPANY.

adjustments. The lower saw is mounted on an automatic feeding carriage controlled by a foot treadle, and the upper saw is carried in an adjustable bearing which allows it to be lowered as it is worn down in diameter. It travels in planed ways, securely gibbed to the table and is operated by a hand lever. Adjustable guide rolls, fences and stops are provided for guiding and holding the work so that after these are once set for a pattern of brace no laying out or preparatory cutting is necessary. This, as anyone connected with car building well knows, means a great saving of time and labor and a corresponding decrease in the cost of turning out work. The framing of this machine is heavy and substantial, the arbors and shafts are made of fine steel, the bearings are long and self-lubricating, the journals are ground, and the workmanship and design are the best in every detail.

NEW PENNSYLVANIA RAILROAD BRIDGE.—The new Pennsylvania Railroad bridge over the Delaware river connecting the West Jersey and the Pennsylvania Railroads was formally opened this week. A large number of the officials of both roads were present. The bridge is of simple truss construction, and is one of the largest bridges of its kind in the country. One of its notable features is also the short time required for its construction. The bridge was authorized by an act of congress in the summer of 1894, and the general plans approved by the secretary of war on October 10 following. The contract for the masonry was awarded in November, and the work under con-

tract was started on March 13, 1895, and completed on October 31. The contract for the iron work was given about one year ago. The work of raising the iron was begun on Oct. 30, 1895, and completed on February 27 last. This new bridge of the Pennsylvania system is 1890 ft. long from shore line to shore line, and in all its length extends 4,900 ft. It has three fixed spans, each 540 ft. long and a draw 330 ft. long. The bridge is supported by six stone piers, and the draw has an elevation 50 ft. above high tide and the tracks are about 58 ft. above high water. The first pier was begun on the New Jersey side of the Delaware on March 13, 1895, and the draw was moved on the first of the present month. There is on the Pennsylvania side 2,200 ft., and on the New Jersey side 323 ft. of trestling. The structure has cost less than \$1,000,000. It contains 26,000 cubic yards of masonry, and the weight of all its spans is about 15,000,000 pounds. It is a through bridge and its trusses above look unusually heavy. During the work of building the foundations of the piers, on July 7 last, the caisson of No. 2 pier upset and was washed away by the high tides. It was brought back, but on August 3 it capsized

again and went aground 3,000 ft. up the river. The caisson was brought back for a second time a week later, righted and kept in position. The bottom of the caisson is 68 ft. under water.

NOTICES OF PUBLICATIONS.

MACHINE SHOP ARITHMETIC. A pocket book containing some of the problems of every day shop life and the way in which they are solved, by Fred H. Colvin, and W. L. Cheney. The first edition, The Practical Publishing Company, East Orange, N. J. 1896. p p 88. Price 50 cents.

This little book, which may be easily carried in the pocket contains examples of simple calculations which come up every day in the work of practical machine shop men together with methods of solving the problems, and simple explanations thereof. A portion of the work has appeared in "Machinery." It is elementary in

character and seems well adapted to the purpose for which it was intended, namely, for the use of machinists and others who are not prepared or qualified by education to work out by themselves the problems which may be presented to them. The subjects of square and cube root, screw cutting, drilling for taps speed of pulleys, milling cutters, and other tools, and foundation principles of arithmetic such as factoring are included.

AIR BRAKE LITIGATION. Westinghouse Air Brake Co. vs. Boyden Brake Company. 28 pages. Illustrated. Not standard size.

This pamphlet has just been received from the Boyden Brake Co., of Baltimore, Md. It contains the decision in full of the United States circuit court of appeals for the fourth circuit, in the recent suit between the Westinghouse and the Boyden people. In addition to the decision itself, which is illustrated, an explanatory statement is given by the Boyden Company outlining the result of the decision and the litigation which preceded this case.

ASSOCIATION OF RAILWAY SUPERINTENDENTS OF BRIDGES AND BUILDINGS. Proceedings of the Fifth Annual Convention, held in New Orleans, La., October 15 and 16, 1895. S. F. Patterson, secretary. Standard size, 6x9 in., pp. 161, illustrated, paper.

This report contains the proceedings of the convention and the papers which were presented, among which was one upon the strength of bridge and trestle timbers, an abstract of which was printed in the RAILWAY REVIEW of October 19, 1895. The paper is accompanied by valuable tables, giving the records of numbers of tests upon timber and the safe average loads as recommended by the association. The volume also contains illustrated papers on the subjects of sand drying plants and methods, upon methods and special appliances for building temporary trestles over washouts and burnouts, best methods of spanning openings too large for box culverts and in embankments too small for arch culverts, pumps and boilers of water stations and best method of erecting plate girder bridges, the last mentioned paper not being illustrated.

TECHNICAL MEETINGS.

The American Society of Civil Engineers holds meetings on the first and third Wednesdays in each month, at 8 p. m., at the House of the Society, 127 East Twenty-third street, New York City.

The American Society of Irrigation Engineers. Third annual meeting will be held at Albuquerque, N. M., September 16-19. John L. Titcomb, secretary, 36 Jacobson block, Denver, Col.

The Association of Civil Engineers of Cornell University meets weekly every Friday, from October to May inclusive, at 2:30 p. m., at Lincoln Hall, New York.

The Association of Engineers of Virginia, holds its informal meetings on the third Wednesday of each month from September to May inclusive, at 8 p. m., at 710 Terry building, Roanoke, Va.

The Boston Society of Civil Engineers, meets monthly on the third Wednesday in each month, at 7:30 p. m., at Wesleyan Hall, 36 Bromfield street, Boston, Mass.

The Canadian Society of Civil Engineers meets every other Thursday at 8 p. m., at 112 Mansfield street, Montreal, P. Q.

The Foundrymen's Association meets monthly on the first Wednesday of each month, at the Manufacturers' Club, Philadelphia, Pa.

The International Irrigation Congress will hold its fourth session at Albuquerque, N. M., September 16-19. Fred L. Alles, secretary, Los Angeles, Cal.; local secretary, W. C. Hadley, E. M., Albuquerque, N. M.

The Montana Society of Civil Engineers meets monthly on the third Saturday in each month, at 7:30 p. m., at Helena, Mont.

The New England Railroad Club meets on the second Tuesday of each month, at Wesleyan Hall, Bromfield street, Boston, Mass.

The New York Railroad Club has a monthly meeting on the third Tuesday in each month, at 8 p. m., at 12 West Thirty-first street, New York City.

North-West Railway Club meets alternately at the West Hotel, Minneapolis, and the Ryan House, St. Paul, on the second Tuesday of each month.

The Northwestern Track and Bridge Association meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m., at the St. Paul Union Station, St. Paul, Minn.

The Southwestern Society of Mining Engineers will hold a session at Albuquerque, N. M., September 16-19. Walter C. Hadley, secretary, Albuquerque, N. M.

The Southern & Southwestern Railway Club holds its meetings on the third Thursday of January, April, August and November, at the Kimball House, Atlanta, Ga.

The Western Foundrymen's Association holds its meeting on the third Wednesday in each month, at the Great Northern Hotel, Chicago, Ill.; secretary, S. T. Johnston, 1522 Monadnock building.

The Western Railway Club of Chicago, holds its meeting on the third Tuesday of each month.

The Central Railway Club meets on the fourth Wednesday of January, March, April, September and October, at 10 a. m., at the Hotel Iroquois, Buffalo, N. Y.

The Technical Society of the Pacific Coast has a monthly meeting on the first Friday in each month at 8 p. m., at the Academy of Sciences building, 819 Market street, San Francisco, Cal.

The Civil Engineers' Club of Cleveland, meets on the second and fourth Tuesdays in each month, at 8 p. m., at the Case Library building, Cleveland, Ohio.

The Denver Society of Civil Engineers meets on the second and fourth Tuesdays in each month except July, August and December, when they are held on the second Tuesday only, at 36 Jacobson building, Denver, Colo.

The Engineers' and Architects' Club of Louisville has a monthly meeting on the second Thursday in each month, at 8 p. m., at the Norton building, Fourth avenue and Jefferson street, Louisville, Ky.

The Engineering Association of the South meets on the second Thursday of each month at 8 p. m., at the Cumberland Publishing House, Nashville, Tenn.

The Engineers' Club of Cincinnati has a monthly meeting on the third Thursday in each month, at 7:30 p. m. at

the Literary Club, 24 West Fourth street, Cincinnati, O. Address P. O. Box 333.

The Engineers' Club of Minneapolis holds its meetings on the first Thursday in each month, at Public Library building, Minneapolis, Minn.

The Engineers' Club of Philadelphia meets on the first and third Saturdays in each month, at 8 p. m., at the house of the club, 1122 Girard street, Philadelphia, Pa.

The Engineers' Club of St. Louis meets on the first and third Wednesdays of each month, at the Missouri Historical Society building, Sixteenth street and Lucas place, St. Louis, Mo.

The Engineers' Society of Western Pennsylvania holds its monthly meeting on the third Tuesday of each month at 7:30 p. m., at the Carnegie Library Building, Allegheny Pa.

PERSONAL.

Mr. Murray B. Auger has been appointed trainmaster of the Elmira, Cortland & Northern Railroad.

Mr. William C. Rowley has been appointed commercial agent of the Michigan Central in Detroit, to take effect on April 1.

Mr. C. O. Eames has been appointed special agent of the Wabash, vice Thomas Furlong, resigned. Mr. Eames was formerly with the Terminal.

Mr. Wm. M. Greene, general manager of the Cincinnati, Hamilton & Dayton, leaves that road to take a similar position on the Baltimore & Ohio.

Mr. W. J. Deppe has been appointed chief clerk in the general passenger department of the Big Four, vice W. J. Lynch, appointed assistant general passenger agent in St. Louis.

Mr. E. L. Brown, heretofore master of transportation, St. Paul & Duluth Railway, has been appointed superintendent of this company. The office of master of transportation is abolished.

Mr. T. D. Hobart has been appointed coal and coke freight agent of the Norfolk & Western, for the receivers. He will have charge of all matters pertaining to coal and coke rates, and will report to the general freight agent.

Until further notice the position of general manager of the Continental Line, made vacant by the appointment of Mr. McLaughlin as general freight agent of the Baltimore & Ohio Southwestern, will be filled by Mr. Archibald Frees, Mr. McLaughlin's chief clerk.

Mr. J. W. Butz, who has been trainmaster for the Texas Midland Railroad for the past three years, has tendered his resignation, effective March 15. Mr. Butz gives up railroading to enter into other business. The office of trainmaster will be abolished after that date.

On March 11, Mr. Charles F. Mayer, late president of the Baltimore & Ohio Railway Co., resigned as a director of the Western Union Telegraph Co. Mr. John K. Cowan, president and one of the receivers of the Baltimore & Ohio, was elected a director of the telegraph company in Mr. Mayer's place.

Mr. Hiram S. Cable, whose appointment to the position of vice president and general manager of the Rock Island & Peoria was noted in this column some weeks ago, will assume the duties of his new position on March 15. Mr. Cable is the son of Mr. R. R. Cable, president of the Chicago, Rock Island & Pacific.

Mr. W. H. Jackson, at present commercial agent of the Rock Island at Pueblo, Colo., has been appointed district freight agent for the same company, with Illinois as his territory and headquarters in Chicago. Mr. Jackson succeeds Mr. J. M. Allen, who has been promoted to the assistant general freight agency.

Mr. W. G. Walter, auditor and traffic superintendent of the Mexican (Veracruz) Railway, has resigned, in order to accept the position of European agent of the Mexican Central and Mexican National Railroads, with headquarters in London. Mr. Walter will leave to assume his new duties, early in April next.

Mr. F. R. Briggs, general passenger agent of the Cleveland, Canton & Southern, has tendered his resignation to Receiver Wardwell, to take effect on the 14th. Mr. Briggs, who has been on the road for many years, and in his present position nearly four years, leaves the service to engage in private business. His successor has not yet been appointed.

Mr. Russell Harding, formerly superintendent of the Dakota division of the Great Northern Railway, has been appointed general superintendent of the Western district, with headquarters at Spokane, Wash., vice Mr. J. M. Barr transferred to the Eastern district. Mr. T. E. Adams, master mechanic Northern division has been appointed superintendent of the Dakota division, vice Russell Harding, while the position thus made vacant by Mr. Adams will be filled by Mr. F. E. Cramer.

Mr. Charles G. Gridley, general agent for the Columbus, Hocking Valley & Toledo Railway, died at his residence in Toledo on March 6. Mr. Gridley's death was caused by blood poisoning, the result of a slight cut made by a razor while being shaved. The injury was not thought to be of any importance at the time and no attention was given to it until a few days ago. Mr. Gridley was 37 years of age and has been in the railroad business since 1876.

It is announced that the position of general western passenger agent of the Cleveland, Cincinnati, Chicago, & St. Louis, at St. Louis, vacated by the resignation of Mr. W. F. Snyder, will be abolished. There will be established, however, the position of assistant general passenger agent, and to this position Mr. Warren J. Lynch has been appointed. Mr. Lynch has been connected with the road for many years, and has recently been chief clerk to the passenger traffic manager. His appointment will take effect on the 1st of April, upon which date Mr. Snyder retires from the service.

Mr. S. T. McLaughlin, at present general manager of the Continental Fast Freight Line, has been appointed general freight agent of the Baltimore & Ohio Southwestern, vice R. M. Fraser, who becomes freight claim agent. Both General Traffic Manager Randolph, whose appoint-

ment was noted last week, and General Freight Agent McLaughlin, will have their headquarters at Cincinnati, while in St. Louis there will be an assistant traffic manager—not yet appointed—and Assistant General Freight Agent Keane. The freight offices were moved from St. Louis to Cincinnati on Monday last.

Some of the recent changes on the Cincinnati, Hamilton & Dayton are as follows: Mr. R. B. Turner, superintendent of the Cincinnati division, succeeds Mr. Waldo as general superintendent; Mr. D. G. Edwards, general passenger agent, assumes the title of passenger traffic manager, and Mr. George H. Smith has been appointed assistant general passenger agent. Mr. F. A. Husted, superintendent of the Dayton & Michigan division, succeeds Mr. Tanner. Mr. S. B. Floeter, of the Wellston division, succeeds Mr. Husted; Trainmaster Gordon succeeds Mr. Floeter, and Chief Dispatcher J. H. O'Connor succeeds Mr. Gordon.

Mr. D. G. Edwards, who was this week promoted to be passenger traffic manager of the Cincinnati, Hamilton & Dayton road, was born in Liverpool, England, in 1852. He entered railway service in 1879 with the Indianapolis & St. Louis road, going to the Delaware & Hudson Canal in 1880 as general traveling passenger agent. From 1881 to 1884 he was general southern agent of the "Bee Line," going thence to the Chesapeake & Ohio as general western passenger agent, which position he retained four years. In 1888 he went to the Queen & Crescent route as assistant general passenger agent, the next year becoming general passenger agent of the same line.

Mr. Martin L. Fouts, who since 1890 has been general agent of the passenger department of the Erie, died suddenly at his home in Cleveland, O., on March 9, of aneurism of the heart. Mr. Fouts has been in the railway business since 1859 at which time he entered the freight office of the Cleveland & Mahoning road at Cleveland as clerk. Subsequently he went with the Atlantic & Great Western, and at one time was joint depot ticket agent for the Atlantic & Great Western, Cleveland, Columbus, Cincinnati & Indianapolis, and Lake Shore & Michigan Southern railways. He was then made city passenger and ticket for the New York, Pennsylvania & Ohio at Cleveland, continuing in that position until 1890, when he was made general agent. Mr. Fouts was about fifty-six years of age.

Mr. Frank Harriott who, since 1888 has been general freight traffic manager of the Baltimore & Ohio has resigned to accept the position of general traffic manager of the Erie. His resignation was tendered some time ago, and was the result of the efforts of the Erie to secure his services. He will have charge of all traffic over the system, and will report to Vice President Cochran, the company's representative on the joint traffic board of managers. Mr. Harriott was born in New York City in 1842, entering railway service in 1872 as contracting agent for the Baltimore & Ohio. In 1875 he was made general agent for the company at Chicago, remaining in that position six years. In 1888, as stated, he became general freight traffic manager, having passed his entire railway career with the B. & O.

Mr. W. G. Wattson, superintendent of the Hudson river division of the West Shore Railroad, who was shot twice in his office at Weehawken last week, died in Roosevelt hospital on the 10th. Edward Clifford, his assailant, was a former detective on the road, but had recently been discharged by the superintendent on a charge of drunkenness. Mr. Wattson entered railway service in 1869 with the Queen Anne & Kent County road (now a part of the Pennsylvania system). In 1870 he went to the Huntington & Broad Top Mountain as telegraph operator and station agent, going the next year to the Allegheny Valley, with which road he remained 12 years. In 1883 he entered the employ of the West Shore, occupying various positions with that road until his death. Mr. Wattson was a prominent member of the New York Railroad Club, having at the December meeting of last year been elected secretary of the club. He was also a member of the executive committee.

Mr. George H. Burrows, for many years superintendent of the western division of the New York Central Railroad, died at Buffalo on the 9th instant. Mr. Burrows was born in New England in 1822, entering railway service on the Connecticut River road in 1838, going to the Rochester, Lockport & Niagara Falls road in 1852 as superintendent of construction. From 1853 to 1857 he was superintendent of the Buffalo & Niagara Falls division of the New York Central. He was then for eight years general superintendent of the Toledo, Wabash & Western, and from 1865 to 1869 superintendent of the construction department for the Saratoga & Hudson. In 1869 he became general superintendent of the Wabash, Lafayette & Bloomington, Decatur & Pekin, Decatur & St. Louis, Hannibal & Naples and Hannibal & Moberly roads. In 1873 he went to the New York Central as superintendent of the western division, which position he still held at the time of his death.

Mr. Charles G. Waldo, general superintendent of the Cincinnati, Hamilton & Dayton, will succeed Mr. Wm. M. Greene, as general manager of that road, effective March 17. Mr. Waldo received the greater part of his railroad education on the Michigan Central, his last position on that road being that of secretary to General Superintendent E. C. Brown. Leaving that position in 1889 he became purchasing agent of the Cincinnati, Hamilton & Dayton and was rapidly promoted to assistant to the president, general superintendent and now to manager of the road. The Cincinnati Post says of Mr. Waldo: "During the several years he has held that position he has made a reputation for himself among railroad men of the country. Mr. Waldo, while a thorough disciplinarian, is genial and affable to all. He is what is known as a strictly business gentleman."

Mr. W. F. Snyder, general western passenger agent of the Big Four, with headquarters at St. Louis, has resigned in order to engage in other business. He will leave the company's service on the 1st of April, but will continue to make St. Louis his home. Mr. Snyder became connected with the old Bee Line in 1882, as assistant ticket agent at St. Louis. Then he was made traveling passenger agent of the road in southwestern territory, with headquarters at Dallas, Tex., and a little later on removed

his office to Kansas City. In 1887 he was appointed general western passenger agent at St. Louis, which position he has occupied for the past nine years. Mr. Snyder has been president of the St. Louis association of general passenger and ticket agents, and is now a member of the executive committee of that body. His retirement from the company will be regretted by all his associates, and all will wish him good fortune and much of it in the future.

RAILWAY NEWS.

Canadian Pacific.—A dispatch from Hamilton, Ont., says that the Canadian Pacific R. will go to Hamilton by way of the Grand Trunk Co.'s tracks from Toronto. The idea of the Canadian Pacific is to build a short track from the valley to connect with the Toronto, Hamilton & Buffalo road, thus going through the city on the Toronto, Hamilton & Buffalo tracks. In an interview Sir William Van Horne is quoted as saying: "Our relations with the New York Central are harmonious and mutually advantageous. As an instance, I can state that among other business, which will be transacted at our annual meeting next month, the shareholders will be asked to approve an arrangement between the Toronto, Hamilton & Buffalo, the Canada Southern, the Michigan Central and the New York Central for the regulation and interchange of traffic and for the division of tolls, rates and charges. The Toronto, Hamilton & Buffalo is a new road. The greater roads mentioned will welcome the lesser. It traverses the Niagara peninsula on the Canadian side and will facilitate the interchange of business between the different interests."

Chesapeake & Ohio.—The line formerly owned by a Glasgow iron and furnace company and called the Belt Line, has been purchased by the Chesapeake & Ohio and that company will now proceed to build a bridge across North river and by means of this Belt Line, make Glasgow the connecting point on the Lexington, Va., branch road, instead of Balcony Falls, which has heretofore been the junction of the roads. This line was originally built to connect the Chesapeake & Ohio and the Norfolk & Western roads, which enter Glasgow on opposite sides of the town, and was sold at auction together with other property of the Glasgow Company.

Denison & Northern.—Two important orders have been issued by Judge C. B. Kilgore, authorizing Receiver Scott, of the Denison & Northern, to issue certificates of indebtedness payable in six months in gold to the amount of \$11,000 per mile, against the Denison & Northern R., to be used in paying off indebtedness and the construction of the road, and also authorizing the receiver to contract with the Mineral Belt Construction Co. for building the road. The order provides that these certificates shall not be sold for less than par.

Federal District.—On March 5 a contract was signed for the sale of the street railway system belonging to the Federal District Co., the price paid being \$7,750,000, of which \$100,000 cash was paid on signing contracts, \$825,000 cash in May and the same amount in the month of July, and the remaining \$6,000,000 to remain as a mortgage at 6 per cent. The buyers are London and South African capitalists who are said to contemplate other large investments there. The present capitalization of the company is \$6,500,000 and pays 7 per cent. The new owners will introduce electricity and modernize and improve the system.

Flint & Pere Marquette—Ann Arbor.—An arrangement has been concluded whereby the Flint & Pere Marquette R. will secure entrance into Toledo over the tracks of the Ann Arbor and will also use the latter company's terminals at that place. The Flint & Pere Marquette will at once extend its line from its present terminus at Monroe, Mich., to a connection with the Ann Arbor. The annual rental has been fixed at \$26,000.

Grand Rapids & Indiana.—An order for foreclosure sale of the Grand Rapids & Indiana R. has been granted by Judge Severns of the United States court at Grand Rapids, Mich. This is a victory for the second mortgage bondholders, who began the suit, and cuts of third mortgage holders entirely. The amount of the second mortgage bonds, the basis of the suit, is \$3,734,765. The sale ordered is subject to the first mortgage bonds, amounting to \$6,157,645, and liens on the company's equipment aggregating \$356,554 more. The third mortgage bonds, on which little or nothing will be realized, amount to \$3,996,000. The bonds are largely held by the Pennsylvania R. Co. The date of sale is fixed for April 27.

International & Great Northern.—It is said the general manager of the International & Great Northern R. has stated that the Georgetown branch will be relaid with steel rails within 60 days. The statement, which comes through the attorney general and railroad commission, is the result of Georgetown's recent complaints.

Kinderhook & Hudson.—This road was sold at auction on March 7 for \$100,000 to a committee representing holders of the first mortgage bonds.

Lake Shore & Michigan Southern—Cleveland Terminal & Valley.—In 1881 the Lake Shore, wishing to secure a connection with the Standard Oil Works, situated on the Valley tracks, made an arrangement with the Valley whereby the Lake Shore would build the necessary connection for the valley, and give it all the time it wished in which to pay for the improvement. Accordingly the Lake Shore purchased the necessary right of way and built the tracks at a cost of \$257,000. Not until the Valley was reorganized several months ago was it in a position to pay for these terminals. But in the reorganization plan provision was made for the purchase. Payment was made about two months ago, and last week all the property which lies between the old Valley terminus at Merwin street, Cleveland, and the Lake Shore tracks, and which for fifteen years has been used by the Valley for terminal, was transferred to the Cleveland Terminal & Valley R. by Mr. S. T. Everett, trustee for the Lake Shore R.

Lake Street Elevated.—The Lake Street Elevated Railroad has nearly completed the laying of its third rail and is pushing the work on its equipment as fast as possible. The principal work yet to be completed is the refitting of ninety-five trail cars with air brakes. It is expected that the road will begin to be operated by electricity by the

middle of April. In new equipment the company bought 30 electric motors from the Wells-French Company, which will be delivered by March 21.

Memphis & Charleston—Southern.—The reorganization plan of the Memphis & Charleston R. provides for the creation of a new company, which will be leased to the Southern R. for 99 years on delivery of all its common stock to the last mentioned line. The Southern R. is one of the five big systems of the United States, and the acquisition of the Memphis & Charleston will put it ahead of the Northern Pacific and into the fourth place, so far as the extent of mileage is concerned. For some time the giant corporation has been absorbing lines in the south until it now has direct lines into all the important southern cities except New Orleans and Memphis. To provide for reorganization expenses and immediate betterments the Southern R. has agreed to purchase \$999,200 of income bonds on preferred stock at the rate of about 55 cents on the dollar. Such income will be offered to stockholders at 40 cents on the dollar on deposit of stock and payment of an assessment of \$4 per share. Stock deposits must be made prior to April 1, and the first \$1 installment of the assessment must be paid on that date. There will be issued \$5,000,000 of non-cumulative incomes or 5 per cent preferred stock in addition to \$6,500,000 of first mortgage 100-year gold bonds bearing 4 per cent, to 1901; 4½ per cent thence to 1906, and 5 per cent thereafter. These last bonds may be increased \$1,500,000 for any extension, and \$1,416,800 for betterments. The rental paid by the Southern under the lease will be sufficient to pay the interest on the new firsts and also upon the new incomes or preferred stock to the extent of the surplus earnings. The floating debt of the Southern will be cleared. Of the original stock of the Memphis & Charleston there was a great deal owned in Memphis, the surrounding territory and along the line of the road; but it has all been disposed of except perhaps \$100,000, the bulk of which is held and controlled by Napoleon Hill, J. C. Neely and James Nathan. That portion of the stock owned locally was of the first issue and was gotten for the right of way, cash subscriptions and for work done. At one time it went down to a price near 9 cents on the dollar, but some 12 years since there was a fight among the large stockholders for the control of the line and in the fight the stock went up to over 70 cents. It was then that the local men unloaded. All of the planning for the reorganization has been done in New York, and it is said the local stockholders do not know much about it.

Oregon Short Line.—The plan for the reorganization of the Oregon Short Line & Utah Northern R., as given by the Boston News Bureau, and which plan has been agreed to by all contending interests, is as follows: "It calls for foreclosure and a new company, to be known as the Oregon Short Line R. Co. It preserves the entire system and also control of the block of Oregon Railway & Navigation stock, which secured the \$13,000,000 collateral trust bonds, the new Short Line Company paying the assessment on the Navigation stock. There are 1,480 miles in the Short Line system and prior liens of \$21,755,000 upon 1,180 miles will remain undisturbed, but the total indebtedness will be only about \$25,000 a mile. The annual fixed charges of the new company will be \$1,553,270, as compared with \$2,788,575 for the old company. Net earnings in 1895 were \$2,273,164, and for the six preceding years averaged \$2,374,432. This reduction in charges is accomplished by converting one-half the present \$10,894 consolidated 5's into 5 per cent non-cumulative "A" income bonds; likewise one-half the \$3,476,000 Utah Southern general and extension 7 per cent mortgages (the other half of these bonds get new 5's), and by converting the \$13,000,000 collateral trust 5 per cent bonds into non-cumulative "B" bonds to receive interest, if earned, 3 per cent for three years and 4 per cent thereafter. The "B" bonds have two directors in the company and income from the navigation stock to secure their own 3 or 4 per cent income; and no lease of the new company can be made without their majority consent or a guaranty of their income. No lien ahead of the "A" and "B" bonds can be created without a majority consent of each. The present \$26,160,200 common stock pays \$12 per share in four installments and receives therefor the new consolidated 5 per cent gold bonds and 50 cent of stock in the new company, the other half of the stock going to the holders of the \$14,370,000 consols and Utah Southern bonds in the ratio of 100 per cent of their holdings, making the total stock of the new company \$27,499,000. Deposits of securities must between March 14 and April 15, both dates inclusive. The assessment on the stock has been underwritten by a syndicate.

Sabine Pass, Alexander & Northwestern.—This road has applied to the railroad commission of Texas for authority to issue \$15,000 of bonds per mile for ten miles of road.

San Francisco & San Joaquin Valley.—The directors of the San Francisco & San Joaquin Valley R. expect to have passenger and freight trains running from Stockton into Merced by May 1. During last week seven miles of track were laid between the Stanislaus river and Dry Creek. Track laying will be delayed for about a week in order to erect a bridge over the latter stream. The piers and approaches are in place and the material for the bridge has been hauled to the creek on the company's cars from Stockton. It was expected that the bridge would be ready for tracklaying by the last of this week.

South Jersey.—The contract for the building of the new line to Ocean City to act as a feeder for the South Jersey R., mention of which was made in this column some weeks ago, is said to have been awarded to Edmunds & Miller, of Philadelphia, who are making active preparations to begin the work, which must be completed by May 15. The new line will connect with the Sea Isle City branch of the South Jersey at Petersburg, and will take an air line to Ocean City, entering it at Fifty-second street, at the southern part of the island and passing through to the north end. Mr. C. Emory Day, the active promoter of the enterprise, is quoted as saying that application for a charter had been made, and that within a few days a meeting of those interested in the new road would be held and an organization effected.

Virginia Iron & Railway.—The Virginia Iron & Railway Co., which operates the Victoria & Western and the Rockbridge, Alum & Goshen roads in addition to its furnace plants, has gone into the hands of a receiver, its former

general manager, Mr. J. Mahoney, having been appointed by court. The corporation's liabilities are \$325,000. Its first mortgage bonds amount to \$200,000, and the balance of its indebtedness is well secured.

Wellston & Ironton.—The Wellston & Ironton R. Co. has been incorporated at Columbus, Ohio. The road is partially built and passes through the three richest coal counties (Gallia, Jackson and Lawrence) in the state. Senator Brice and General Sam Thomas of New York, are the projectors and heavy owners.

NEW ROADS AND PROJECTS.

California.—The California Eastern R. Co. has just been incorporated in California to build a railway from San Bernardino, Cal., to Good Springs, Nev., 75 miles. This company is the purchaser of the Nevada Southern R., to which it will obtain title at the expiration of the statutory six months for redemption. This road was constructed in 1893 from Blake, Cal., north to Marvel, Cal., 30 miles, but owing to the failure to place the bonds, the company was unable to meet its construction bills and became insolvent. The property was placed in the hands of Mr. R. S. Seibert as receiver, by whom it has been operated during the past two years, and it will continue in his charge until the expiration of the redemption period. The incorporators of the new company are Roger W. Woodbridge, Wm. N. Byers, Earle B. Coe, E. M. Crauston and Robert J. Pitlin, all of Denver, Colo. Capital stock, \$1,500,000.

Colorado.—An extension to the Burlington & Missouri River is to be built from Longmont via Fort Collins to Steamboat Springs. This new line will be known as the Fort Collins, North Park & Western Ry., and will run through Hahn's Peak mining district. The company has been incorporated and has a capital stock of \$1,000,000.

The Colorado Springs & Cripple Creek R. Co. is the name under which a new road has been incorporated to run between the two places mentioned. The line, which will be about 29 miles in length, has been surveyed and is estimated to cost \$1,750,000. Mr. W. S. Stratton, owner of some of the principal gold mines at Cripple Creek, is the chief promoter, although the incorporators are J. A. McCormick and F. L. Burton of Chicago; L. S. Atkinson, W. R. Benzie and Q. E. Hicks of Colorado Springs. It is expected that the construction will be commenced at an early date. Capital stock, \$1,000,000.

Illinois.—On March 12, articles of incorporation were filed with the secretary of state at Springfield, for the construction of a new railroad under the name of Chicago Midland Transit Co. It is proposed to construct and operate a railroad from Blue Island to Niles Center, thence to Hammond, Ind., thence to Lemont and Evanston. The company's principal office is to be located at Chicago. The incorporators and first board of directors are John E. Wilkie, Herman J. Beiling, Malcom McDonald, Alfred E. Janes and Fred T. Conklin, all of Chicago. Capital stock, \$100,000.

Maine.—It is reported the Redington Lumber Co. will sometime during the spring begin the construction of a narrow gauge railroad to form a branch of the Phillips & Rangeley road from Dead river ballast pit extending north to Kennebag lake, a distance of 9¾ miles. In addition to opening up the extensive lumber tracts in the vicinity of Seven Ponds, which is the prime object for the construction of the road, it will be convenient for sportsmen who wish to visit Richardson Brothers' hotel at Kennebag. The distance from Kennebag to the mills of the company at Redington will be but 16 miles, and one engine can haul 50,000 ft. of logs a day over the road. As the route north from Kennebag is level it is thought not improbable that the road will in time be extended toward Megantic, through the rich timber lands.

Mexico.—Headquarters for the Gulf, Rio Grande & Pacific have been opened at Juarez, Mex. It is said that an engineering corps has been organized and field work will begin immediately upon receipt of some important papers from the City of Mexico. These documents are said to be a bill granting a subsidy of \$16,000 per mile and 5 per cent forty year bonds for the company, to which it is necessary to have the signature of President Diaz before active work can begin. The bill calls for the construction of the standard gauge railway from Scotola, Merina, on the Gulf coast, in the state of Tamaulipas, thence to Monterey, thence to Sierra Jojaada, thence to Thuanex opposite El Paso, Tex., and thence to Mazatlan on the Pacific coast. The hurried assembling of the engineering corps before the concession has been signed is said to be due to the presence of another company which is preparing to build from Juarez to Mazatlan, and has purchased a similar concession granted by the government several years ago. The Gulf, Rio Grande & Pacific is reported to be backed by a French syndicate.

The grading outfits and 2,000 workmen arrived last week at Puente de Ixla and began construction of the Inter-oceanic R. extension to the Pacific coast under direction of Col. J. H. Hampson, the American contractor, to whom the concession for the road was recently transferred. Col. Hampson is at present in Denver, Colo., attending a meeting of the company associated with him in his Mexican railroad enterprises. He also has a large force of men at work constructing the Pacific coast extension of the Mexican Central R. from Guadalajara.

The Financial Times of London says: "The new railway across the Mexican Isthmus of Tehuantepec, which forms a fresh link between the Atlantic and Pacific, has not, perhaps, attracted so much attention as its importance deserves. Among the advantages it offers are the shortness of the route, the length being only 130 miles, cheap freight rates, ranging from \$3.15 to \$6 per ton, and a considerable saving in time on the journey between London and various Chinese and American ports as compared with the Panama route. It is thought that a fair proportion of the trade with China and Japan which now goes via San Francisco and Vancouver will be attracted to the new route, and as the local business is also likely to be large, the railway ought to have a prosperous future before it."

Missouri.—Articles of incorporation have been filed with the secretary of state at Jefferson City, Mo., for the Cass-

ville, Harrison & Southeastern. The proposed line will be about 15 miles in length and will connect Cassville, county seat of Barry county, with the St. Louis & San Francisco road between Exeter and Butterfield stations in the same county. The incorporators are George A. Purdy, Frank Dodd and W. Cloud, all of Peirce City; H. W. Hicks and Robert Johnston, of Monett.

New Brunswick.—A party is being organized in charge of Mr. Tyler C. Burpee, late assistant engineer of the Bangor & Aroostook, to take the field at once to make the location for the Woodstock & Centreville, N. B., Railway. The projectors of this enterprise expect to begin construction as soon as the spring opens. Mr. Frank D. Lawlor is chief engineer.

South Carolina.—We understand that the contracts for the construction of 115 miles of railway to be built in South Carolina have been let to W. B. Strang, Jr., & Co., of 15 Wall street, New York City. The line is to be known as the Greenwood, Anderson & Western, and will extend from Seivern, in Aiken county, to Greenville, in Greenville county, S. C. Work will start at once and will be pushed to completion, so that the road will be ready to handle this year's cotton crop.

South Dakota.—It is stated that the Wyoming & Black Hills, the organization of which has already been noted, is becoming an assured thing, and that arrangements are fast being perfected. Mr. H. M. Cutler of Boston, an expert who was sent out by eastern capitalists to investigate the matter, says there are thousands of acres near Sundance that are underlaid by gigantic bodies of coal. The coal is a high grade article, excellent for steam purposes, and gives better coke tests than any other west of the Missouri river. The veins are from three to six feet thick. One tunnel is already in several hundred feet, and from it quantities of coal have been taken for several years for local domestic purposes. Another tunnel has been extended 700 ft. into a hill and a vein of coal five feet thick, with a sandstone roof, has been opened up. Attorney General Fowler of Wyoming, several Cheyenne bankers, and other officials of the state, with Sundance citizens, have obtained possession of 7,520 acres of the coal land, and will give the ground to the road that builds into the coal fields.

Texas.—Reports say that the president has signed the bill granting a three years' extension of time to the Gainesville, McAlester & St. Louis road. The survey extends through the Indian territory and the charter was about to expire. The extension of time means that the road will be built.

West Virginia.—A charter has been granted to the Coal River R. Co., of West Virginia, to build a railroad from St. Albans to the Norfolk & Western in Mercer county. The line will run via Peytona on Big Coal river, the junction of Marsh & Clear Forks, and Marsh Fork, with a branch 50 miles long from the Forks of Coal to Boone Court House, thence to the headwaters of Pond Fork and the Wyoming county line. The minimum capital stock is \$20,000, with privilege of increasing it to \$5,000,000. Incorporators: Robert T. Oney, Roman Pickens, Thomas L. Broun, Stephen T. Teays, Joel H. Meadows, Cassius D. Hereford and Fontaine Brown. Principal office, Charleston, W. Va.

INDUSTRIAL NOTES.

Bridges.

—The Hudson Highland Bridge & Railway Company, a reorganization of the Hudson Suspension Bridge & New England Railway Company, has filed articles of incorporation with the secretary of state of New York. The company's capital is placed at \$34,900, and the directors are John N. Hazard, Edward W. Sorel and Robert Sorel of New York; Henry Martin, Wm. G. Lord and William J. Pierce, of Brooklyn, and William D. Suow, of New Milford, N. J. The old company secured a charter from the legislature in 1858 for the purpose of constructing a suspension bridge over the Hudson river at a point between Verplanck's Point and Buttermilk Falls.

—The Duluth, Mesaba & Northern Railway will build a steel bridge over the St. Louis river at the second crossing, with double track foundations and piers. The bridge span will be 102 ft. and in all will cost \$16,000. This company's new building at Proctor Knott containing dispatcher's and ticket offices, waiting and reading rooms, etc., will be completed about the 17th of March.

—The Como Avenue bridge over the tracks of the Great Northern Railway in St. Paul is nearly completed. This is a riveted lattice pony truss of three spans crossing the tracks at an oblique angle. One-third the cost of this bridge is borne by the railroad company, and the remainder by the city of St. Paul. The superstructure is built by the Wisconsin Bridge Company.

—It has been decided to construct an iron and steel bridge, 580 ft. long, across the Tar river, Tarboro, N. C., after plans and specifications now ready. A committee has been appointed to receive bids.

—Bids will be received till April 7 for the construction of an iron bridge after plans and specifications now on file in the office of the county surveyors, Galveston, Tex.

—Bids are asked until April 7 for constructing an iron bridge over Clear Creek, near the International & Great Northern Railway bridge, Galveston county, Tex. The county also proposes to build a bridge at Sampson street, but the time for letting the contract has not yet been decided upon.

—The Toledo Bridge Works will begin running full capacity March 23. For a few weeks only about 100 men have been employed at this plant. When working full, over 300 men are on the pay rolls. An inventory of stock has been taken, and a new bed for the engine has been placed in the building. It was not from lack of orders that the plant has been working less than half the regular force, but from necessity. A new engine was put in a year ago on the old bed, and now the old bed has given out and must be replaced. The company are behind on orders, and will, perhaps, be compelled to put on an extra force of men to catch up again.

—The council has decided to rebuild the bridge carrying the water main across the Medxmakeag river, Woodstock, N. B.; length of bridge, 162 ft., to be of iron or steel. Correspondence is invited from those willing to undertake the work.

—Major Chas. E. B. L. Davis has submitted plans and estimates for the proposed Anacostia bridge at First street, Washington, D. C., to cost \$779,130. A draw opening 150 ft. wide is favored.

—The question of constructing a bridge over Flushing Creek, Flushing, N. Y., will be voted upon April 10. No plans will be prepared until after the question of construction has been decided and appropriations made. The superstructure will cost about \$10,000 and the substructure \$15,000.

—A dispatch from Chattanooga, Tenn., states County Engineer Betts has completed drawings and estimates for the new bridge across Chattanooga Creek. If the plans are approved by the bridge commissioners work will commence on the structure at once.

—The city engineer of Sioux City, Ia., has prepared estimates for a new bridge for the Correctionville road at corner of Fairview and Rustin avenues in that city.

—The bridge committee of Kings county, N. Y., will co-operate with Queens county supervisors in spanning Newton creek with a bridge. County Treasurer Taylor will be asked to issue \$125,000 in bonds.

—Bids will be received at the office of the county clerk of Lancaster county, Neb., until March 24 for the furnishing of all material and labor necessary for the construction and completion of all pile bridges that may be necessary in said county for the year 1896.

—A new steel bridge is soon to be built near Corbin, Mont., at a cost of nearly \$200,000.

—The Chesapeake & Ohio Railroad Co. will build an iron bridge across the North river, to connect the Lexington branch road with the main line of the Chesapeake & Ohio, the junction being ordered changed from Balcony Falls, where connection is now made.

—It is proposed to construct a bridge between Bessemer and Port Perry, Pa., a distance of about 2,500 ft., according to reports. The Carnegie Steel Co. and the Second Avenue Traction Co. are interested.

—Plans for the proposed draw bridge, to cost about \$180,000, over the Quinnipiac river at Grand avenue, New Haven, Conn., have been prepared.

—The high water of March first played havoc with many New England bridges. Three bridges on the Northern division of the Maine Central Railroad were washed away, also five bridges over the Presumpscot river at Westbrook and Cumberland, besides several others in Cumberland county, Me. Three iron bridges in Dover, N. H., have been destroyed; also one iron and two wooden structures over Cold river, at Acworth, N. H. One bridge was wrecked at Haydenville, Mass.; two over the Westfield river at Huntington, Mass., and several at Pittsfield, Mass. Ten highway bridges over the Pequaback river, in Connecticut, were carried away. At Crowley's Junction, Me., the bridge over the Androscoggin; the Boston & Maine bridge at Great Works; four highway bridges on the Piscataquog, near Manchester, N. H. At Belfast, Me., seven bridges were carried away. The Bradbury bridge at Biddeford was destroyed. In North Berwick, Me., 18 out of the 21 bridges in the township were washed away.

Buildings.

—The molding shop and part of the hammer shop at the Midvale Steel Works, in Nicetown, Pa., were destroyed by fire on March 2; reported loss, \$50,000; fully insured.

—Press reports state that it is officially announced that the Chicago & Northwestern and the Burlington, Cedar Rapids & Northern railways will erect a \$150,000 union depot at Cedar Rapids, Iowa, during the summer. Options have been secured on the land and work will probably be commenced in the spring.

—It is stated that more than \$600,000 will be expended by the Boston & Maine Railroad Co. in new buildings and betterments in Concord and Manchester, N. H.

—Two new iron bridges will be built by the Portland & Rumford road during the summer, in place of the wooden ones. When these are finished there will be only one wood structure left, which will probably be replaced by an iron one in the near future. This company will build a coal shed about 40x225 ft. It will be built to hold 3,500 tons of coal. This road will also ballast five miles of the main line on the old Rumford Falls & Buckfield Railroad, and this piece of road will also have the alignment corrected. It plans to use 12,000 new ties and 1½ miles of standard steel rails in the work. This improvement will be carried on until the whole line is brought up to the high standard of the new extensions.

—It is reported that Carter Bros., car builders, of Newark, Cal., are soon to establish a branch manufactory at Lathrop. The old roundhouse abandoned by the Southern Pacific will be utilized. It is expected that the Commercial Association of Stockton will offer to erect a structure such as needed by them in Stockton, providing they will locate there.

Cars and Locomotives.

—Robert W. Hunt & Co., 1137 The Rookery Chicago, is inspecting the construction of 150 cars at the works of the Ensign Manufacturing Co., Huntington, W. Va., for the San Francisco & San Joaquin Valley Railroad Co. The same firm has been given the inspection of 600 ore cars to be built by the Pullman Palace Car Co. for the Duluth, Missabe & Northern Railway; 450 ore cars to be built by the Terre Haute Car & Manufacturing Co. for the Duluth & Iron Range Railroad and 400 ore, 20 flat and 4 caboose cars to be built by the Wells & French Co. for the Lake Superior & Ishpeming Railway Co.

—The foundry and machine shops of J. H. Bass, Chicago are running full time on orders for car wheels and heavy railroad work. Four hundred men are now employed.

—Apropos to the material increase of trade in the car

building industry during the past year it may be stated that the Pennsylvania Railroad Co. contracted for the construction of about 8000 cars during that period all of which will be delivered before the close of the present year.

—It is now stated that the contract for the Lehigh Valley cars will not be awarded before April 1. All the cars to be built will be standard coal car of 60,000 lbs. capacity. The number to be built has not yet been decided. Bids has been asked on 1,000 and 2,000.

—The Seaboard Air Line which lately ordered several engines from the Richmond Locomotive Works is now reported as contemplating ordering several more. This company will also soon give an order for considerable additional rolling stock, principally heavy freight cars, to be used on the North Carolina divisions.

—The Central of New Jersey is asking bids on 1,000 freight cars.

—The Ohio River road, of West Virginia, is reported to have ordered three 10-wheel 50-ton locomotives from the Brooks Locomotive Works. The engines are to be built within 60 days.

—The St. Charles Car Works has begun the delivery of 500 cars building for the Toledo, St. Louis & Kansas City.

—The Southern Pacific Co. has placed an order for 15 engines, to be delivered during the coming summer. Six will be exact counterparts of the big 12-wheel locomotives now employed on its mountain divisions. These engines can haul 27 loaded freight cars, over the heavy grades of the Sierras. The other nine engines will be 10-wheelers and will be used for either passenger or freight business.

Iron and Steel.

—Several records were lately broken in the steel plants of the Ohio Steel Co., at Youngstown, O. On one day 269 ingots were rolled, and on the same night 282 was the output, equaling any previous 24 hours' work. On the following night 303 ingots were rolled, amounting to almost 750 tons.

—What is claimed to be the finest iron and steel laboratory in the United States has just been completed at the Edgar Thomson Steel Works. It is 76 x 27 ft. The furnace and steel works laboratories will now be combined at a great saving to the Carnegie Co.

Machinery and Tools.

—On Monday, March 9, the Chicago Pneumatic Tool Co. received another order from London for 10 hammers of the "B" size used for general boiler work; also for a star hammer and two of its Manning sandpapering machines. The Star is used for riveting stay bolts and other light riveting. This makes 73 hammers shipped by this company to London since December 15 last. The company will have a new catalog finished next week which will illustrate its sandpapering machine; also the hammer, chipping castings, and all classes of work that pneumatic tools are adapted for.

—The De La Vergne Refrigerating Co., of New York City, has received the contract to build six drum hoisting machines, to be used in operating six large double boom tower derricks, to be operated in the construction of the new courthouse at Baltimore. This plant was designed by Gust Pers Wern, of New York City, in connection with O. D. Lieseuring, engineer for John Gill & Sons and D. W. Thomas, the general contractors. Each derrick will be anchored at the base and its height will be extended as the building rises. The derricks will be of large capacity and will handle brick by the cart load and stones weighing 15 tons each, and will be operated by line shafts.

—The Westinghouse Electric Co. has contracted with the Ironton Structural Steel Co., Duluth, Minn., for the electrical apparatus for two 25 ton traveling cranes, which are among the heavy machinery in the plant. The contract is the first of a number for various articles of machinery required for the enlargement of the steel plant. The two traveling cranes are designed to handle heavy beams and hot blooms. Additional important contracts will be let within a few days.

—The Fitchburg Machine Works, Fitchburg, Mass., is having a large trade on heavy drill presses and lathes, being obliged to run nights to keep up with orders. A commendable feature of this night work is the serving of a lunch, prepared by a caterer, with their pay going on just the same. The Company has built a very complete pattern-makers' lathe for the Herreshoffs, at Bristol, R. I., which is a most convenient and rigid lathe. It has a gap, made by running the top of bed back, and has a complete lathe carriage which is mounted on substantial ways the same as an engine lathe. For large turning, the back end of the lathe spindle is threaded for face-plate, as is usual, and is provided with a cap to protect the thread of spindle when face-plate is not in use.

—John Mohr & Son, 32 to 42 Illinois street, Chicago, are rebuilding their South Chicago works, with the intention of securing one of the best equipped boiler making plants in the country. The equipment will consist of the most modern appliances for handling heavy work, including electric traveling cranes, very large shears and punches, hydraulic riveters, etc. The machinery will be driven by independent electric motors. Sargent & Lundy, Monadnock building, Chicago, is making the electric installation.

—Propositions have been made to the Wagoner Manufacturing Co., Hamilton and Sidney, O., for the removal of its foundry and machine shop to Muncie, Ind. The company makes a specialty of lathes.

—J. S. Mundy, Newark, N. J., has ready for distribution a pocket edition of his very complete catalog of hoisting engines, steam boilers, etc. The book is copiously illustrated and contains over 70 pages. It is just the right size to carry in one's pocket without being in the least bulky or in the way. Copies, we are informed will be forwarded engineers, contractors, and others interested, upon application.

—The McMyler Manufacturing Co., of Cleveland, O., has completed the erection of a coal hoisting machine for Brown & Co. Incorporated, operating the Wayne Iron & Steel Works at Pittsburgh. This coal machine is located on the Pittsburgh bank of the Allegheny river and will

lift coal from barges in the Allegheny river into the mills of the firm.

—An additional floor space of 26 x 75 ft. has been secured by the W. A. Jones Foundry & Machine Co., 57 and 59 South Jefferson street, Chicago, to accommodate its increased trade in cast iron pulleys and power transmission appliances. New machine tools have been added to the equipment of these shops.

—Pullman's Palace Car Company is enlarging its plant, at Pullman, by adding an iron working machine shop, in connection with the freight car department. It will cover about 25,000 square feet of floor space, and when fully equipped will contain some \$70,000 worth of machine tools.

—The property of the Dayton Coal & Iron Co., in Rhea county, Tennessee, has been purchased by a syndicate represented by Peter Donaldson and Thomas N. Mackinnon of Glasgow, Scotland. The property transferred embraces 5,000 acres of coal lands, two mines in operation, coke ovens and two blast furnaces of 150 tons capacity each at Dayton, estimated in value at \$200,000.

—The Colorado Iron Works Co. has been incorporated, with headquarters at Denver; capital stock, \$240,000; incorporators: John H. Moreum, Samuel H. Nesmith and Isabel Nesmith Evans.

—The Woodstock Iron Works, Anniston, Ala., has completed the enlarging the capacity of its coke furnace to 160 tons per diem, and has erected a new hot air stove and a new blowing engine of 600 horse power built by the Reading Iron Co. Other extensive additions and repairs have been made and the plant is now in first-class order. The company has a large stock of coke on hand, together with an abundant supply of ore, but will not blow in the furnace until the iron market shows a permanent improvement.

—The Steelton Reporter notes a brighter outlook at the works of the Pennsylvania Steel Co. Considerable inquiry is being made for the various products of the works and several good contracts were closed this week. The output of the open hearth department, considering the number of furnaces at work, has been heavy. The rail mill made a big run on 70 lb sections, averaging over 650 tons per day. The bridge and construction and machine departments are very busy. The frog, switch and signal department is not very busy, having about enough to keep one turn at work. It is stated that changes will be made in the machinery at the steel rail mills of the Maryland Steel Co. to provide for the manufacture of angular iron for building purposes of every description. There is always a large demand in the market of the world for iron of this description, and with all equipments for its manufacture, it is thought that the idle machinery at the works can resume operations on full time. It is also stated that the postponed meeting of the stockholders of the company will be held on May 15.

—The net returns of the Tennessee Coal & Iron Co., for 11 months of the fiscal year, show \$458,832 above charges. The preferred dividend calls for \$80,000 per annum, leaving \$378,832 for the common stock. February returns, it is said, will swell this so that there will be shown for the fiscal year more than 2 per cent on the common stock. This corporation, which is one of the most important in the south, owes its development, in a large measure, to Baltimoreans, who are now heavy holders of its securities.

Miscellaneous.

—The Gates Iron Works has changed the location of its office in Chicago to suite 1112 Masonic Temple, where the members of the firm will be pleased to welcome their friends and patrons, and where they are invited to make their headquarters when in Chicago.

—The Pennsylvania Iron Works Co. has recently determined to extend its business by going into the field of hydraulic engineering in all its branches, and to that end have secured the services of Mr. Ernest W. Naylor, and in addition thereto has succeeded to the rights and privileges of all patents, patterns, etc., owned by him. The company is therefore in a position to enter this new field upon a good basis and any inquiries addressed to it will receive prompt consideration.

—George W. Callahan & Co., railway contractors of Knoxville, Tenn., write that they have secured the contract to build the first section of the La Follette Coal & Iron Co.'s railway, 14 miles, and expect to let sub-contracts at once.

—The Illinois Central Co. has obtained permission to build several miles of switches to its property along the river front and to cotton compresses. About \$80,000 will be expended in this work.

—The Southern Pacific Co. will build a short spur at Algiers near New Orleans for use in shipping and loading coal. A derrick and steam shovel will be required for hoisting purposes.

—A decree has been entered in connection with the reorganization of the Bucyrus Steam Shovel & Dredge Co. of South Milwaukee, approving the undisputed claims filed with the court, ordering a sale of all the property of the company and authorizing holders of first mortgage bonds and unsecured claims to use these in its purchase. The exact date of sale has not yet been fixed, but it is expected to take place about March 20.

—The receiver of the Joliet (Ill.) Enterprise Co. has been ordered by the circuit court to advertise the sale of the company's mills, to take place on April 8. The mills cost \$300,000, and are ready to be put in operation.

—The National Switch & Signal Co. has been awarded the contract for installing an interlocking plant for the Lake Street Elevated, Chicago, at Avers avenue, which is a junction point. This plant includes the installation of the automatic torpedo signals and other appliances for the protection of traffic. The company has also been awarded the contract for interlocking the crossing of the Northwestern Coal Railway Co. with the Omaha Line at Superior, Wis.

—The Taunton Locomotive & Manufacturing Co., of Taunton, Mass., has received an order from the Steinway Electric Railway Co., of Long Island City, N. Y., for Taunton Track sprinklers, with a capacity of 2,700 gals. each.